PATENT ABSTRACTS OF JAPAN

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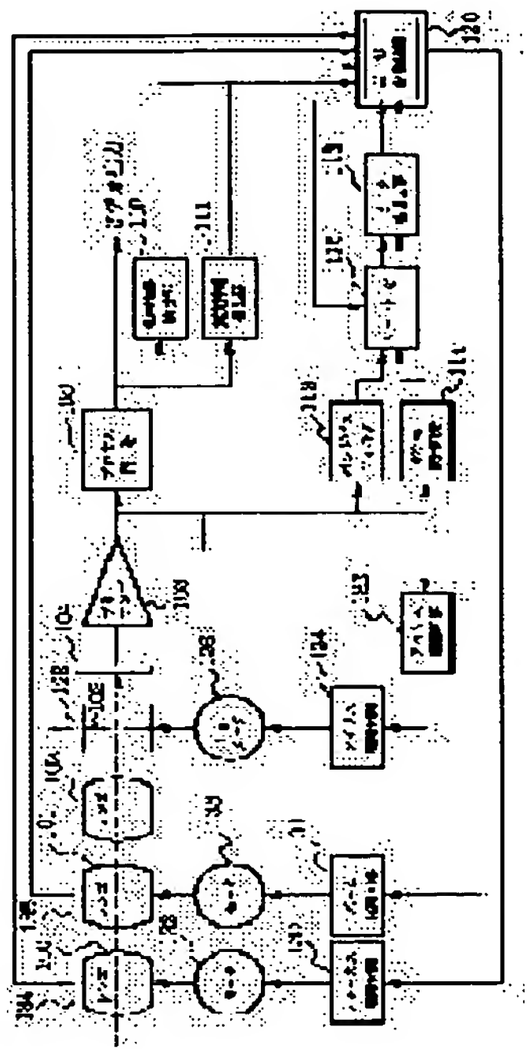
(54) LENS CONTROLLER

(57)Abstract:
PURPOSE: To provide an automatic focusing device which can stop a focusing lens at a focusing point with high accuracy when a person, etc., are photographed.
CONSTITUTION: A logical controller 120 sets the speed of a focusing motor 132 by a high frequency component of a video signal extracted by a band pass filter 112, and out-of-focus width of an edge part of an object to be photographed in a screen extracted by an out-of-focus detecting circuit 114. Subsequently, by color signal B, R detected by a complexion information detecting part 110, and a brightness signal Y detected by a brightness information detecting part 111, color difference signal B-Y, R-Y of a screen center area are detected, and when these color difference signals B-Y, R-Y are in a complexion area set on a color vector, a speed of the focusing motor 132 is set to a low speed.



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CLAIMS

[Claim(s)]
[Claim 1] The lens control unit characterized by to have a detection means detect beige information from a video signal, a distinction means to by_which the main photographic subject distinguishes whether you is a person by the detecting signal of said detection means, and a speed setting means set up the drive speed of said optical system at the time of automatic focus mode according to the distinction result of this distinction means in the control unit which has an automatic focus means control movable optical system and this optical system in automatic focus mode in the direction of an optical axis in order to adjust a focus.
[Claim 2] Said speed setting means is a lens control unit according to claim 1 characterized by setting drive speed of said optical system as a low speed when it distinguishes that the main photographic subject is a person.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the lens control unit equipped with the automatic focus equipment applied to electronic image pick-up equipments, such as a video camera and an electronic "still" camera.
[0002]
[Description of the Prior Art] Generally, with the electronic image pick-up equipment which has a 2-dimensional image sensor like a video camera, the video signal of a photographic subject detects the sharpness of a screen, and the method of controlling the location of a FOKASHINGU lens and doubling a focus is used so that this sharpness may become max. As this sharpness, the reinforcement of the high frequency component of the video signal extracted with the band pass filter and the detection reinforcement of the dotage width of face in the edge section of the photographic subject which differentiated the video signal by the differential circuit etc. and was acquired are used.
[0003] When the usual photographic subject is photoed, in the condition of ****ing out of the focus, this sharpness becomes large as it is small and a focus suits it, and after the focus has suited completely, it reaches maximum. Conventionally, this speed is gradually made late as sharpness moves a FOKASHINGU lens in the direction which becomes large as quickly as possible and becomes large, when this sharpness is small, and generally the so-called climbing-a-mountain method automatic focus (it abbreviates to mountain-climbing AF below) which stops a FOKASHINGU lens with a sufficient precision on the crest of sharpness is used for control of a focusing glass.
[0004]
[Problem(s) to be Solved by the Invention] however , by the conventional describe [above] mountain climbing AF method , since the image of the face will be in a low contrast condition when the most common person as a photographic subject etc. be photo , since it be set up so that the drive speed of a focusing glass may be focus with sufficient precision to a common photographic subject , there be a trouble that a FOKASHINGU lens cannot be stop with sufficient precision in a focus point and become easy to generate the so-called hunting .
[0005] In view of the above-mentioned conventional trouble, this invention aims at offering the automatic focus equipment which can be made to suspend a FOKASHINGU lens with a sufficient precision in a focusing point, when a person etc. is photoed.
[0006]
[Means for Solving the Problem] In a control unit which has optical system movable [in order that this invention may attain the above-mentioned purpose] in the direction of an optical axis in order to adjust a focus, and an automatic focus means to control this optical system in automatic focus mode It is characterized by having a detection means to detect beige information from a video signal, a distinction means by which the main photographic subject distinguishes whether you are a person by detecting signal of said detection means, and a speed setting means to set up drive speed of said optical system at the time of automatic focus mode according to a distinction result of this distinction means. For example, said speed setting means sets drive speed of said optical system as a low speed, when it distinguishes that the main photographic subject is a person.

[0007]
[Function] By the above-mentioned configuration, since the drive speed of optical system becomes slow when the main photographic subject distinguishes that he is a person from beige information, this invention can stop a FOKASHINGU lens with a sufficient precision in a focusing point, also when the image of the face changes into a low contrast condition.
[0008]
[Example] Hereafter, the example of this invention is explained with reference to a drawing. Drawing 1 is the block diagram showing the configuration of one example of the automatic focus equipment concerning this invention.
[0009] In drawing 1 , the front ball lens group (focusing glass group) 100 movable in the direction of an optical axis for focusing, the zooming lens group 101 movable in the direction of an optical axis for zooming, the lens group 102 of immobilization of an amendment system, the drawing 103 that can be opened and closed, and a solid state image sensor 104 are arranged. The focusing glass group 100 and the zooming lens group 101 are driven by motors 132 and 133, respectively, and drive motors 132 and 133 by the focal drive circuit 130 and the zoom drive circuit 131 control of the logic-control circuit 120, respectively.
[0010] Opening and closing drawing 103 in the ig meter 126, it drives the ig meter 126 by the iris drive circuit 124 control of the iris control circuit 122. Thus, it extracts as the focusing glass group 100 and the zooming lens group 101 which were driven, the location of 103 is detected by encoders 134, 135, and 128, respectively, and each detecting signal is outputted to a logical control unit 120.
[0011] The image in which image formation was carried out by the above-mentioned optical system 100-103 is changed into an electrical signal by the solid state image sensor 104, and this video signal is amplified by pre amplifier 106, and after image processing is performed by the process circuit 108, it is outputted to a video outlet terminal etc. Moreover, the video signal processed by the process circuit 108 is supplied to the beige information detecting element 110 and the brightness information detecting element 111, and the video signal amplified by pre amplifier 106 pretends ignorance band pass filter 112 with the iris control circuit 122, and is supplied to the width-of-face detector 114.
[0012] The beige information detecting element 110 detects the chrominance signals B and R for distinguishing the flesh color of a middle-of-the-screen field with the video signal processed by the process circuit 108, and outputs them to a logical control unit 120, and the brightness information detecting element 111 detects the brightness in a screen with the video signal processed by the process circuit 108, and outputs the detecting signal Y to a logical control unit 120. A band pass filter 112 extracts the high frequency component of the video signal amplified by pre amplifier 106, and the dotage width-of-face detector 114 differentiates the video signal amplified by pre amplifier 106, and detects the dotage width of face of the edge section of the photographic subject in a screen. Ignorance is pretended band pass filter 112, and each detecting signal of the width-of-face detector 114 is outputted to the peak detector 118 through a gate circuit 116, and peak value is detected and it is outputted to a logical control unit 120.
[0013] In addition, the iris control circuit 122 is extracted through the iris drive circuit 124 and the ig meter 126, and 103 is opened and closed so that the quantity of light of the light-receiving side of a solid state image sensor 104 may become proper with the video signal amplified by pre amplifier 106.
[0014] According to each detection information that it was inputted, at the time of automatic focus mode, that the focusing glass group 100 should be driven, a logical control unit 120 outputs a drive control signal to the focal drive circuit 130, and, as for the drive circuit 130, usually drives a motor 132 according to this signal so that the focus degree of an image pick-up screen may become max.
[0015] Next, actuation of a logical control unit 120 is explained with reference to drawing 2 - drawing 5 . First, in the beige information distinction routine shown in step 200 of drawing 2 , the photographic subject of a middle-of-the-screen field distinguishes whether you are a person by the detecting signal of the beige information detecting element 110. By this beige information distinction routine, as shown in drawing 3 in detail, the chrominance signals B and R detected by the beige information detecting element 110 and the luminance signal Y detected by the

brightness information detecting element 111 detect color-difference-signal B-Y of a middle-of-the-screen field, and R-Y first (step 300).
[0016] At continuing step 302, this color-difference-signal B-Y and R-Y distinguish whether it is in the beige field set up on the color vector. In addition, like the field A shown in drawing 4 , this beige field is set up so that any flesh colors other than human being may not be detected as much as possible. And when it judges with color-difference-signal B-Y and R-Y being in this beige field, "person information" is turned ON (step 304), and "person information" is turned OFF when it judges with it not being in another side and a beige field (step 306).
[0017] A/D conversion of the analog value which shows the dotage width of face of the edge section of the photographic subject in the screen extracted by the high frequency component and the dotage width-of-face detector 114 of the video signal extracted with the band pass filter 112 to drawing 2 at return and step 202 is carried out, it is incorporated, and it progresses to a focusing motor speed configuration routine as subsequently to drawing 5 shown in detail (step 204).
[0018] At step 400 shown in drawing 5 , in progressing to 402 or less step in judging and exceeding whether the level of a high frequency component exceeds a threshold TH1, and not exceeding, it branches to step 404 and sets the speed of the focusing motor 132 as max. At step 402, a dotage width-of-face detecting signal judges whether it is less than two threshold TH, sets the speed of the focusing motor 132 to the two or more threshold TH case whenever [middle] (step 406), and, in the case of less than two threshold TH, sets up the speed of the focusing motor 132 at min (step 408).
[0019] At continuing step 410, it distinguishes [ON or] whether it is off and, in ON, progresses at step 412, and the "person information" set up in the above-mentioned beige information distinction routine jumps to step 414, in being off. At step 412, a predetermined value is subtracted from the absolute value of the speed set up in steps 404, 406, and 408, and the speed of the focusing motor 132 is set up late.
[0020] And at continuing step 414, it fades with a high frequency component and time series change of width of face determines the driving direction of the focusing motor 132. That is, if it judges that the focusing glass group 100 is moving in the focus direction, a driving direction is set up as it is and time series change decreases when this time series change is increasing, it will judge that the focusing glass group 100 is keeping away from the focusing point, and a driving direction will be reversed.
[0021] The focal drive circuit 130 is controlled according to the speed and the direction which were set as drawing 2 in the above-mentioned focusing motor speed configuration routine at return and step 206, and in continuing step 208, it fades with a high frequency component and judges whether it is a focus condition by the degree of change of width of face. If it distinguishes from the condition of not focusing and return and the degree of change become small at step 200 when the degree of this change does not become small, it will be judged as a focus, and will progress to step 210, and the focusing motor 132 will be stopped. At continuing step 212, if a photographic subject etc. moves, it fades [whether the focus condition is maintained and], it distinguishes according to the decreasing state of width of face and a focus condition is no longer maintained, it will return to step 200 and same processing will be performed.
[0022] As mentioned above, since speed of the focusing motor 132 is made late when a person etc. is photoed and the image of the face changes into a low contrast condition, the hunting phenomenon in the mountain-climbing AF method can be decreased, and a FOKASHINGU lens can be stopped with a sufficient precision in a focusing point.
[0023]
[Effect of the Invention] In the control unit which has optical system movable in the direction of an optical axis as explained above, in order that this invention may adjust a focus, and an automatic focus means to control this optical system in automatic focus mode A detection means to detect beige information from a video signal, and a distinction means by which the main photographic subject distinguishes whether you are a person by the detecting signal of said detection means, Since it has a speed setting means to set up the drive speed of said optical system at the time of automatic focus mode according to the distinction result of this distinction means, also when the image of the face changes into a low contrast condition, a FOKASHINGU

lens can be stopped with a sufficient precision in a focusing point.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of one example of the automatic focus equipment concerning this invention.
[Drawing 2] It is a flow chart for explaining actuation of the logical control unit of drawing 1 .
[Drawing 3] It is a flow chart for explaining detailed actuation of the beige information distinction routine of drawing 2 .
[Drawing 4] It is explanatory drawing showing the beige field in the beige information distinction routine of drawing 3 .
[Drawing 5] It is a flow chart for explaining detailed actuation of the focusing motor speed configuration routine of drawing 2 .
[Description of Notations]
100 Focusing Glass Group
104 Solid State Image Sensor
110 Beige Information Detecting Element
111 Brightness Information Detecting Element
112 Band Pass Filter
114 Dotage Width-of-Face Detector
120 Logical Control Unit
130 Focal Drive Circuit
132 Focusing Motor

[Translation done.]

* NOTICES *

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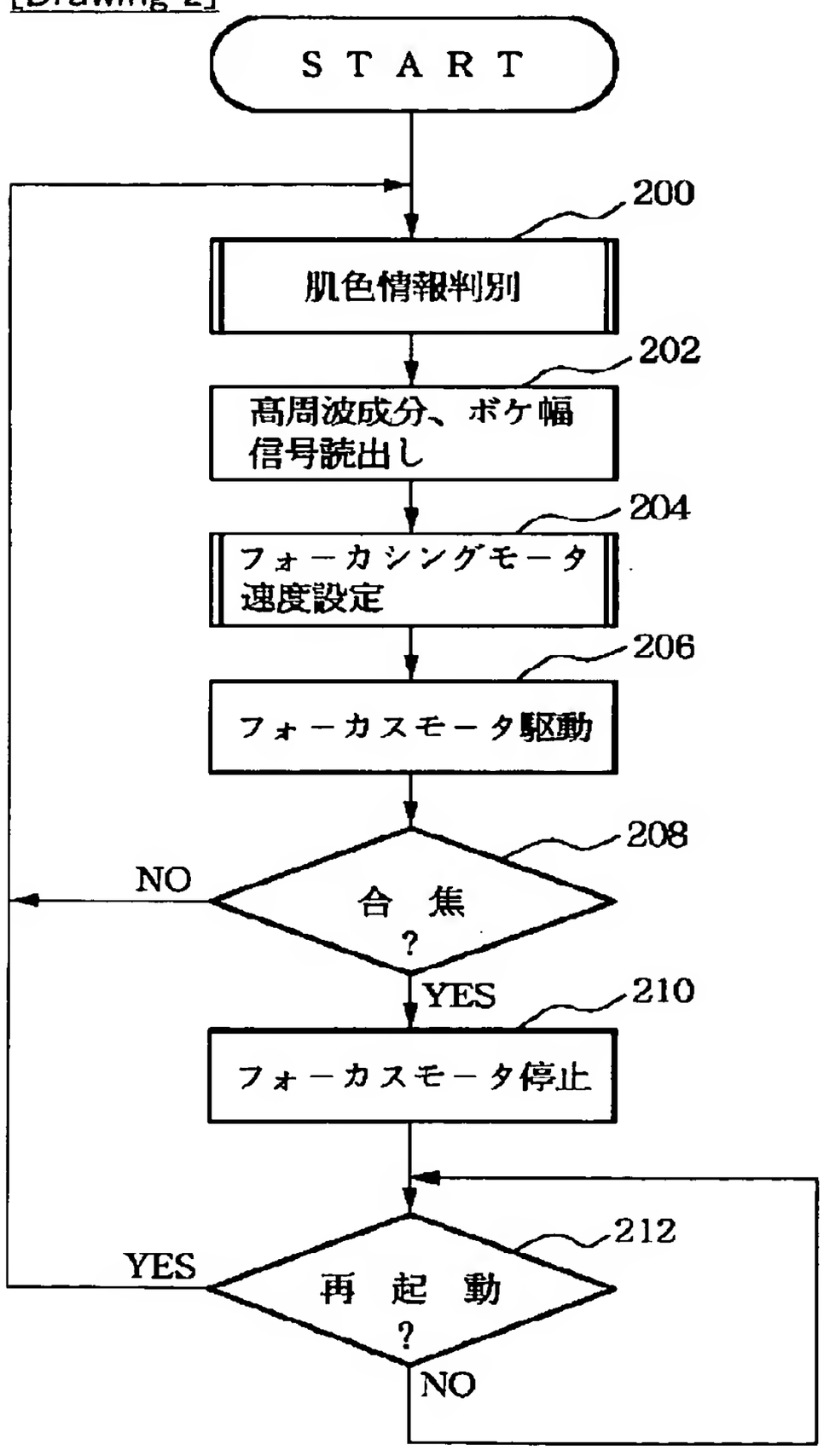
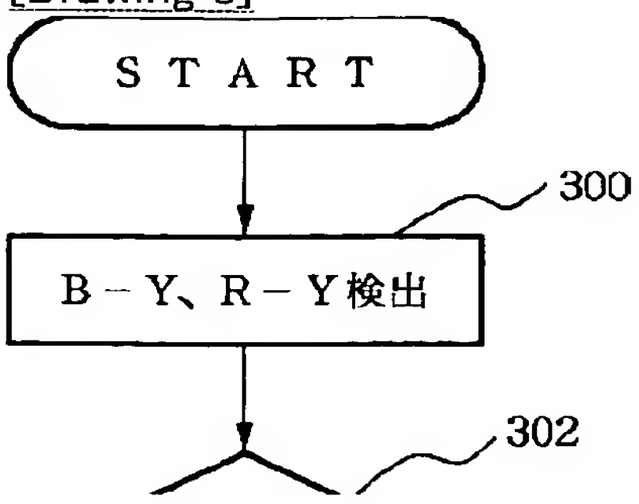
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

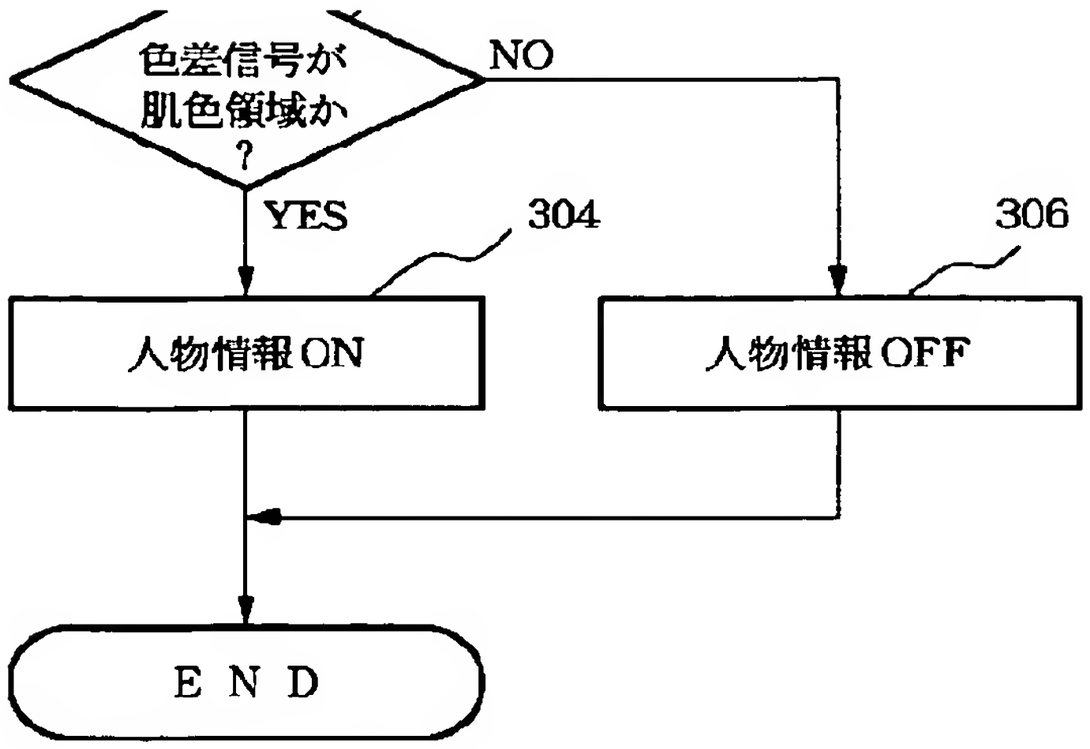
DRAWINGS

[Drawing 2]

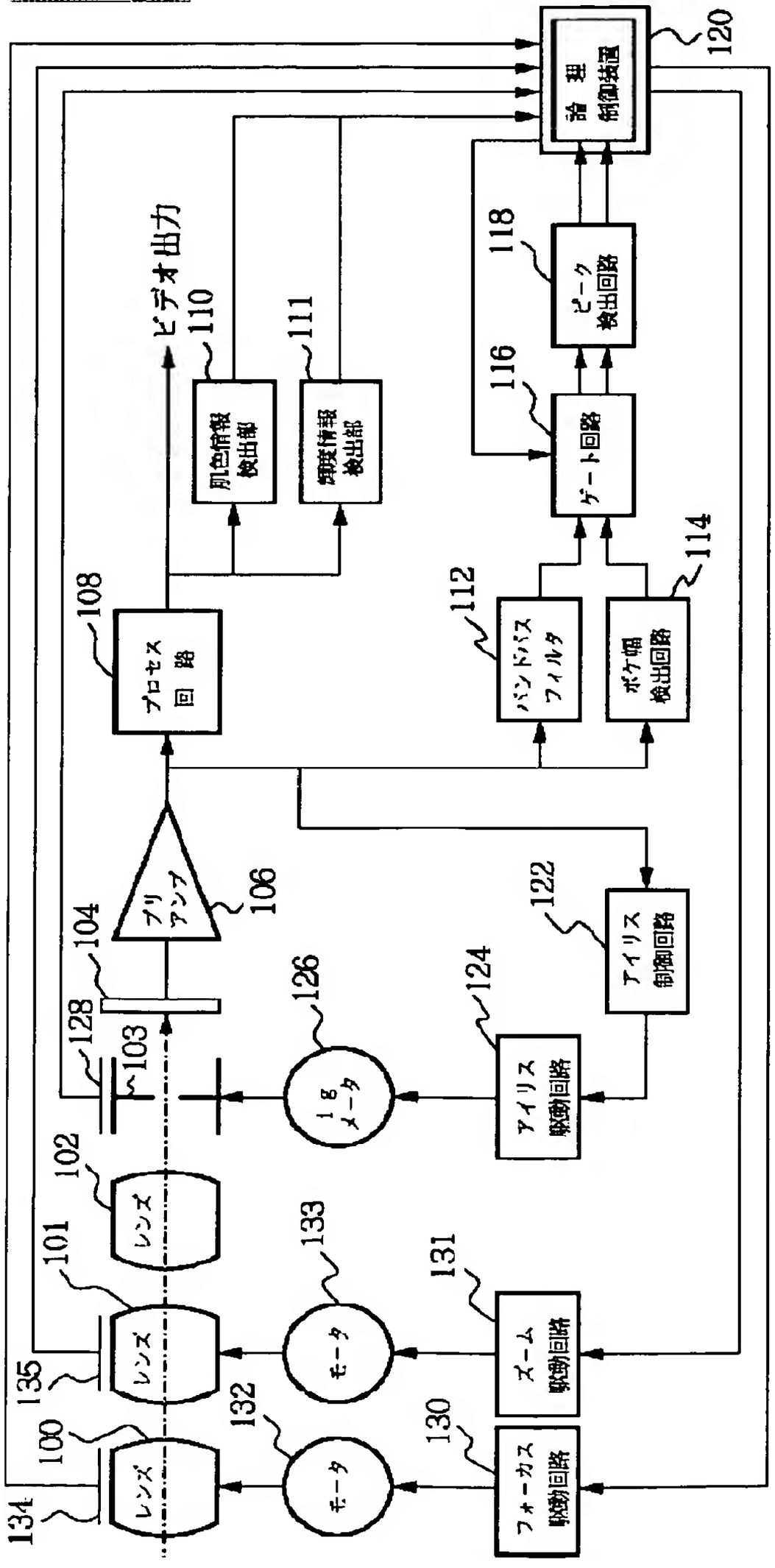


[Drawing 3]

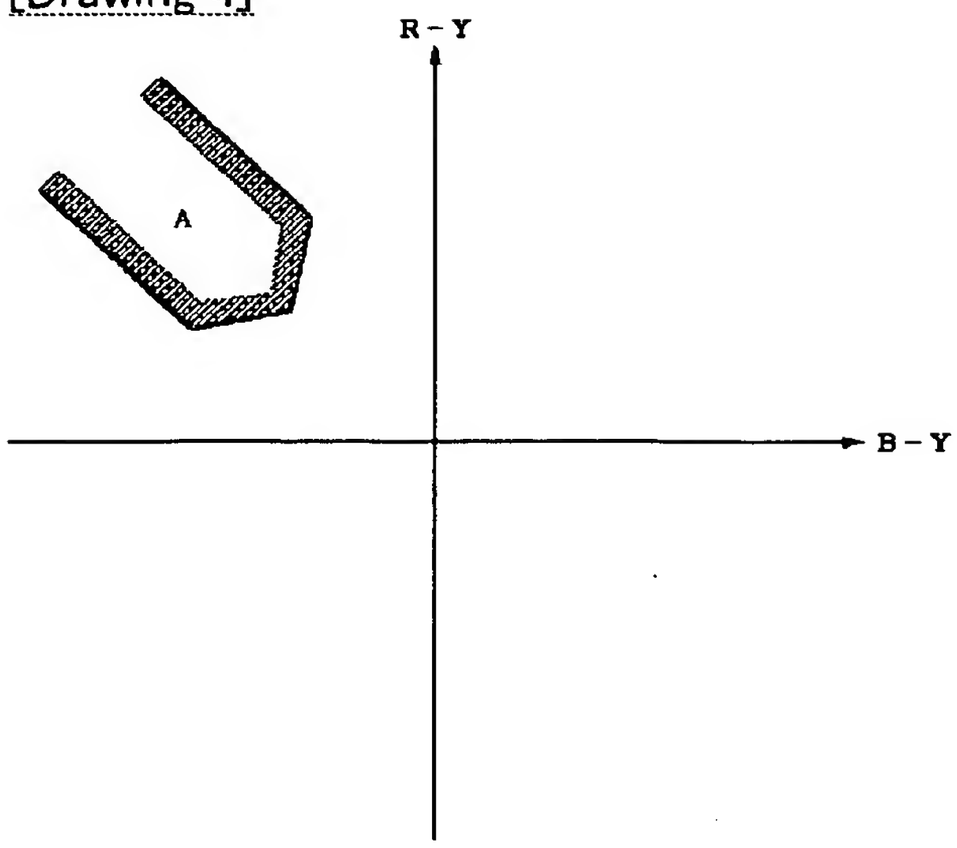




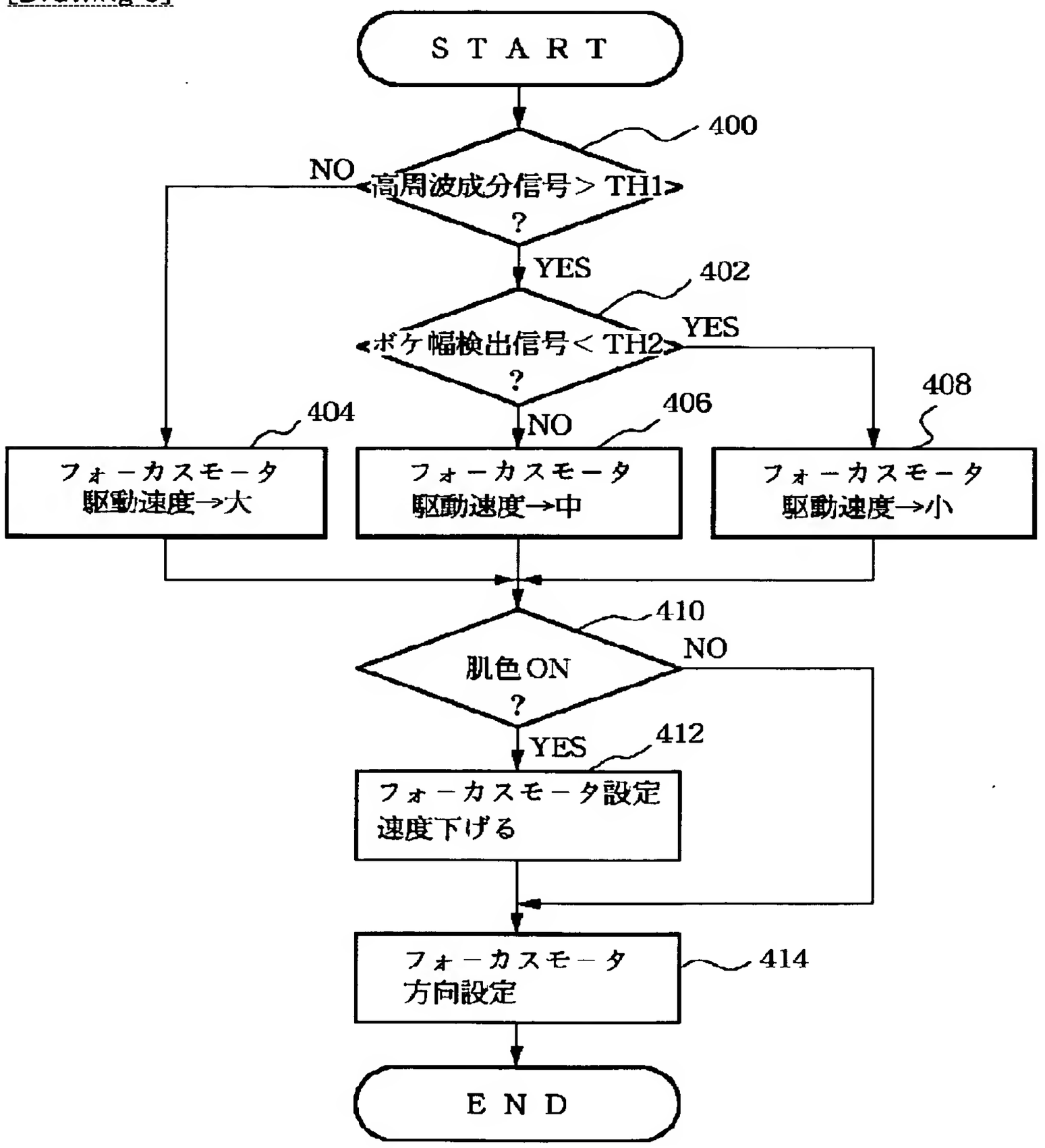
[Drawing 1]



[Drawing 4]



[Drawing 5]



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Ｈ０４Ｎ　5/232		Ｅ　9187－5Ｃ		

審査請求　未請求　請求項の数２(全　６　頁)

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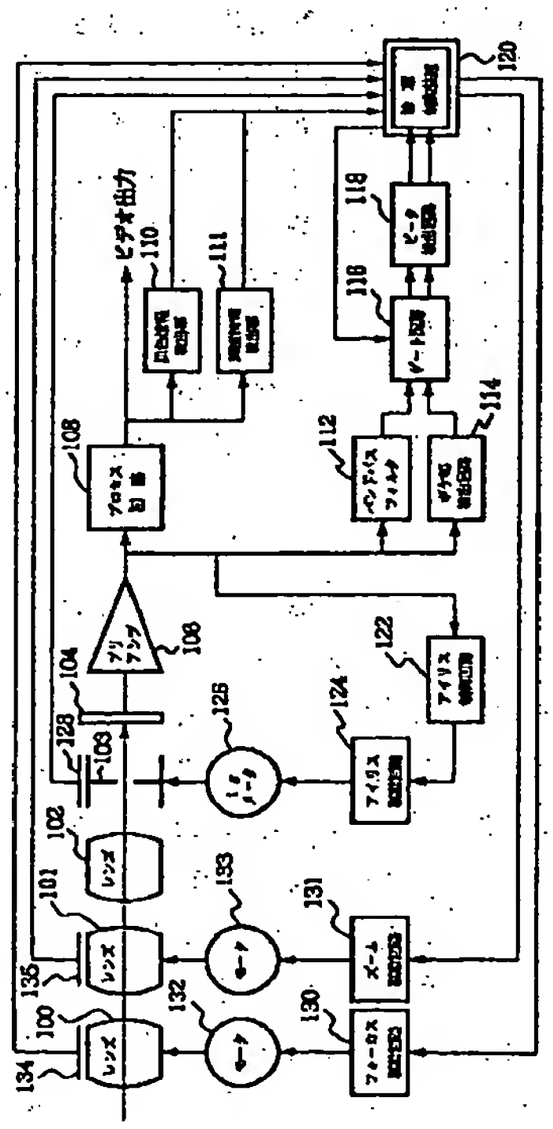
(54)【発明の名称】　レンズ制御装置

(57)【要約】
【目的】　人物等を撮影した場合にフォーカシングレンズを合焦点において精度よく停止させることができる自動合焦装置を提供する。
【構成】　論理制御装置１２０は、バンドパスフィルタ１１２により抽出された映像信号の高周波成分と、ぼけ幅検出回路１１４により抽出された画面内の被写体のエッジ部のぼけ幅によりフォーカシングモータ１３２の速度を設定する。そして、肌色情報検出部１１０により検出された色信号Ｂ、Ｒと、輝度情報検出部１１１により検出された輝度信号Ｙにより画面中央領域の色差信号Ｂ－Ｙ、Ｒ－Ｙを検出し、この色差信号Ｂ－Ｙ、Ｒ－Ｙが色ベクトル上で設定された肌色領域内の場合にはフォーカシングモータ１３２の速度を遅く設定する。



【特許請求の範囲】
【請求項１】　焦点を調節するために光軸方向に移動可能な光学系と、該光学系を自動合焦モードで制御する自動合焦手段とを有する制御装置において、
映像信号から肌色情報を検出する検出手段と、
前記検出手段の検出信号により主被写体が人物か否かを判別する判別手段と、
該判別手段の判別結果に応じて自動合焦モード時の前記光学系の駆動速度を設定する速度設定手段とを有することを特徴とするレンズ制御装置。
【請求項２】　前記速度設定手段は、主被写体が人物であると判別したとき前記光学系の駆動速度を低い速度に設定することを特徴とする請求項１記載のレンズ制御装置。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、ビデオカメラや電子スチルカメラ等の電子撮像装置に適用される自動合焦装置を備えたレンズ制御装置に関する。
【０００２】
【従来の技術】一般に、ビデオカメラのように二次元撮像素子を有する電子撮像装置では、被写体の映像信号により画面の鮮鋭度を検出し、この鮮鋭度が最大になるようにフォカーシングレンズの位置を制御してピントを合わせる方法が用いられている。この鮮鋭度としては、バンドパスフィルタにより抽出された映像信号の高周波成分の強度や、微分回路等により映像信号を微分して得られた被写体のエッジ部におけるぼけ幅の検出強度が用いられる。
【０００３】通常の被写体を撮影した場合、この鮮鋭度は、ピントがぼけている状態では小さく、ピントが合うにつれて大きくなり、ピントが完全に合った状態で最大値に達する。従来、フォーカシングレンズの制御には、この鮮鋭度が小さい場合に鮮鋭度が大きくなる方向にフォカーシングレンズをできるだけ速く移動させ、大きくなるにつれてこの速度を徐々に遅くし、鮮鋭度の山の頂上でフォカーシングレンズを精度良く停止させるいわゆる山登り法オートフォーカス（以下山登りＡＦと略す）が一般に用いられている。
【０００４】
【発明が解決しようとする課題】しかしながら、上記従来の山登りＡＦ法では、フォーカシングレンズの駆動速度を一般的な被写体に対して精度よく合焦するように設定されているので、被写体として最も一般的な人物等を撮影した場合、顔面の映像が低コントラスト状態になるので、フォカーシングレンズを合焦点において精度よく停止させることができない、いわゆるハンチングが発生しやすくなるという問題点がある。
【０００５】本発明は上記従来の問題点に鑑み、人物等を撮影した場合にフォカーシングレンズを合焦点において精度よく停止させることができる自動合焦装置を提供することを目的とする。
【０００６】
【課題を解決するための手段】本発明は上記目的を達成するために、焦点を調節するために光軸方向に移動可能な光学系と、該光学系を自動合焦モードで制御する自動合焦手段とを有する制御装置において、映像信号から肌色情報を検出する検出手段と、前記検出手段の検出信号により主被写体が人物か否かを判別する判別手段と、該判別手段の判別結果に応じて自動合焦モード時の前記光学系の駆動速度を設定する速度設定手段とを有することを特徴とする。例えば、前記速度設定手段は、主被写体が人物であると判別したとき前記光学系の駆動速度を低い速度に設定する。
【０００７】
【作用】本発明は上記構成により、肌色情報から主被写体が人物であると判別した場合に光学系の駆動速度が遅くなるので、顔面の映像が低コントラスト状態になった場合にもフォカーシングレンズを合焦点において精度よく停止させることができる。
【０００８】
【実施例】以下、図面を参照して本発明の実施例を説明する。図１は、本発明に係る自動合焦装置の一実施例の構成を示すブロック図である。
【０００９】図１において、フォーカシングのために光軸方向に移動可能な前玉レンズ群（フォーカシングレンズ群）１００と、ズーミングのために光軸方向に移動可能なズーミングレンズ群１０１と、補正系の固定のレンズ群１０２と、開閉可能な絞り１０３と、固体撮像素子１０４とが配置されている。フォーカシングレンズ群１００とズーミングレンズ群１０１はそれぞれモータ１３２、１３３により駆動され、モータ１３２、１３３はそれぞれ、論理制御回路１２０の制御によりフォーカス駆動回路１３０とズーム駆動回路１３１により駆動される。
【００１０】絞り１０３は、ｉｇメータ１２６により開閉し、ｉｇメータ１２６は、アイリス制御回路１２２の制御によりアイリス駆動回路１２４により駆動される。このように駆動されたフォーカシングレンズ群１００とズーミングレンズ群１０１と絞り１０３の位置はそれぞれ、エンコーダ１３４、１３５、１２８により検出され、各検出信号は、論理制御装置１２０に出力される。
【００１１】上記光学系１００～１０３により結像された映像は、固体撮像素子１０４により電気信号に変換され、この映像信号は、プリアンプ１０６により増幅され、プロセス回路１０８により映像処理を施された後ビデオ出力端子等に出力される。また、プロセス回路１０８により処理された映像信号は、肌色情報検出部１１０と輝度情報検出部１１１に供給され、プリアンプ１０６により増幅された映像信号は、アイリス制御回路１２２

と、バンドパスフィルタ１１２とぼけ幅検出回路１１４に供給される。

【００１２】肌色情報検出部１１０は、プロセス回路１０８により処理された映像信号により画面中央領域の肌色を判別するための色信号Ｂ、Ｒを検出して論理制御装置１２０に出力し、輝度情報検出部１１１は、プロセス回路１０８により処理された映像信号により画面内の明るさを検出してその検出信号Ｙを論理制御装置１２０に出力する。バンドパスフィルタ１１２は、プリアンプ１０６により増幅された映像信号の高周波成分を抽出し、ぼけ幅検出回路１１４は、プリアンプ１０６により増幅された映像信号を微分して画面内の被写体のエッジ部のぼけ幅を検出する。バンドパスフィルタ１１２とぼけ幅検出回路１１４の各検出信号は、ゲート回路１１６を介してピーク検出回路１１８に出力され、ピーク値が検出されて論理制御装置１２０に出力される。

【００１３】尚、アイリス制御回路１２２は、プリアンプ１０６により増幅された映像信号により固体撮像素子１０４の受光面の光量が適正になるように、アイリス駆動回路１２４とｉｇメータ１２６を介して絞り１０３を開閉する。

【００１４】論理制御装置１２０は、入力された各検出情報に応じて、撮像画面の合焦度合が最大になるように、通常自動合焦モード時には、フォーカシングレンズ群１００を駆動すべく、フォーカス駆動回路１３０に駆動制御信号を出力し、駆動回路１３０は該信号に応じてモータ１３２を駆動する。

【００１５】次に、図２～図５を参照して論理制御装置１２０の動作を説明する。先ず、図２のステップ２００に示す肌色情報判別ルーチンにおいて、肌色情報検出部１１０の検出信号により画面中央領域の被写体が人物か否かを判別する。この肌色情報判別ルーチンでは、図３に詳しく示すように、先ず、肌色情報検出部１１０により検出された色信号Ｂ、Ｒと、輝度情報検出部１１１により検出された輝度信号Ｙにより画面中央領域の色差信号Ｂ－Ｙ、Ｒ－Ｙを検出する（ステップ３００）。

【００１６】続くステップ３０２では、この色差信号Ｂ－Ｙ、Ｒ－Ｙが色ベクトル上で設定された肌色領域内であるか否かを判別する。尚、この肌色領域は、図４に示す領域Ａのように、人間以外の肌色を極力検出しないように設定されている。そして、色差信号Ｂ－Ｙ、Ｒ－Ｙがこの肌色領域内であると判定した場合には「人物情報」をオンにし（ステップ３０４）、他方、肌色領域内でないと判定した場合には「人物情報」をオフにする（ステップ３０６）。

【００１７】図２に戻り、ステップ２０２では、バンドパスフィルタ１１２により抽出された映像信号の高周波成分と、ぼけ幅検出回路１１４により抽出された画面内の被写体のエッジ部のぼけ幅を示すアナログ値をＡ／Ｄ変換して取り込み、次いで、図５に詳しく示すようなフォーカシングモータ速度設定ルーチンに進む（ステップ２０４）。

【００１８】図５に示すステップ４００では、高周波成分のレベルが閾値ＴＨ１を越えるか否かを判定し、越える場合にはステップ４０２以下に進み、越えない場合にはステップ４０４に分岐してフォーカシングモータ１３２の速度を最大に設定する。ステップ４０２では、ぼけ幅検出信号が閾値ＴＨ２未満か否かを判定し、閾値ＴＨ２以上場合にはフォーカシングモータ１３２の速度を中程度に設定し（ステップ４０６）、閾値ＴＨ２未満の場合にはフォーカシングモータ１３２の速度を最小に設定する（ステップ４０８）。

【００１９】続くステップ４１０では、上記肌色情報判別ルーチンにおいて設定された「人物情報」がオンかオフかを判別し、オンの場合にはステップ４１２に進み、オフの場合にはステップ４１４にジャンプする。ステップ４１２では、ステップ４０４、４０６、４０８において設定された速度の絶対値から所定の値を減算し、フォーカシングモータ１３２の速度を遅く設定する。

【００２０】そして、続くステップ４１４では、高周波成分とぼけ幅の時系列変化によりフォーカシングモータ１３２の駆動方向を決定する。すなわち、この時系列変化が増加している場合にはフォーカシングレンズ群１００が合焦方向に移動していると判断して駆動方向をそのままに設定し、時系列変化が減少するとフォーカシングレンズ群１００が合焦点から遠ざかっていると判断して駆動方向を逆転させる。

【００２１】図２に戻り、ステップ２０６では、上記フォーカシングモータ速度設定ルーチンにおいて設定された速度と方向に応じてフォーカス駆動回路１３０を制御し、続くステップ２０８において、高周波成分とぼけ幅の変化の度合により合焦状態か否かを判定する。この変化の度合が小さくならない場合には非合焦状態と判別してステップ２００に戻り、変化の度合が小さくなると合焦と判断してステップ２１０に進み、フォーカシングモータ１３２を停止させる。続くステップ２１２では、被写体等が動いて合焦状態が維持されているか否かをぼけ幅の減少状態により判別し、合焦状態が維持されなくなるとステップ２００に戻って同様な処理を行う。

【００２２】上述のように、人物等を撮影して顔面の映像が低コントラスト状態になった場合、フォーカシングモータ１３２の速度を遅くするので、山登りＡＦ法におけるハンチング現象を減少してフォカーシングレンズを合焦点において精度よく停止させることができる。

【００２３】

【発明の効果】以上説明したように、本発明は、焦点を調節するために光軸方向に移動可能な光学系と、該光学系を自動合焦モードで制御する自動合焦手段とを有する制御装置において、映像信号から肌色情報を検出する検出手段と、前記検出手段の検出信号により主被写体が人

物か否かを判別する判別手段と、該判別手段の判別結果に応じて自動合焦モード時の前記光学系の駆動速度を設定する速度設定手段とを有するので、顔面の映像が低コントラスト状態になった場合にもフォカーシングレンズを合焦点において精度よく停止させることができる。

【図面の簡単な説明】

【図１】本発明に係る自動合焦装置の一実施例の構成を示すブロック図である。

【図２】図１の論理制御装置の動作を説明するためのフローチャートである。

【図３】図２の肌色情報判別ルーチンの詳細な動作を説明するためのフローチャートである。

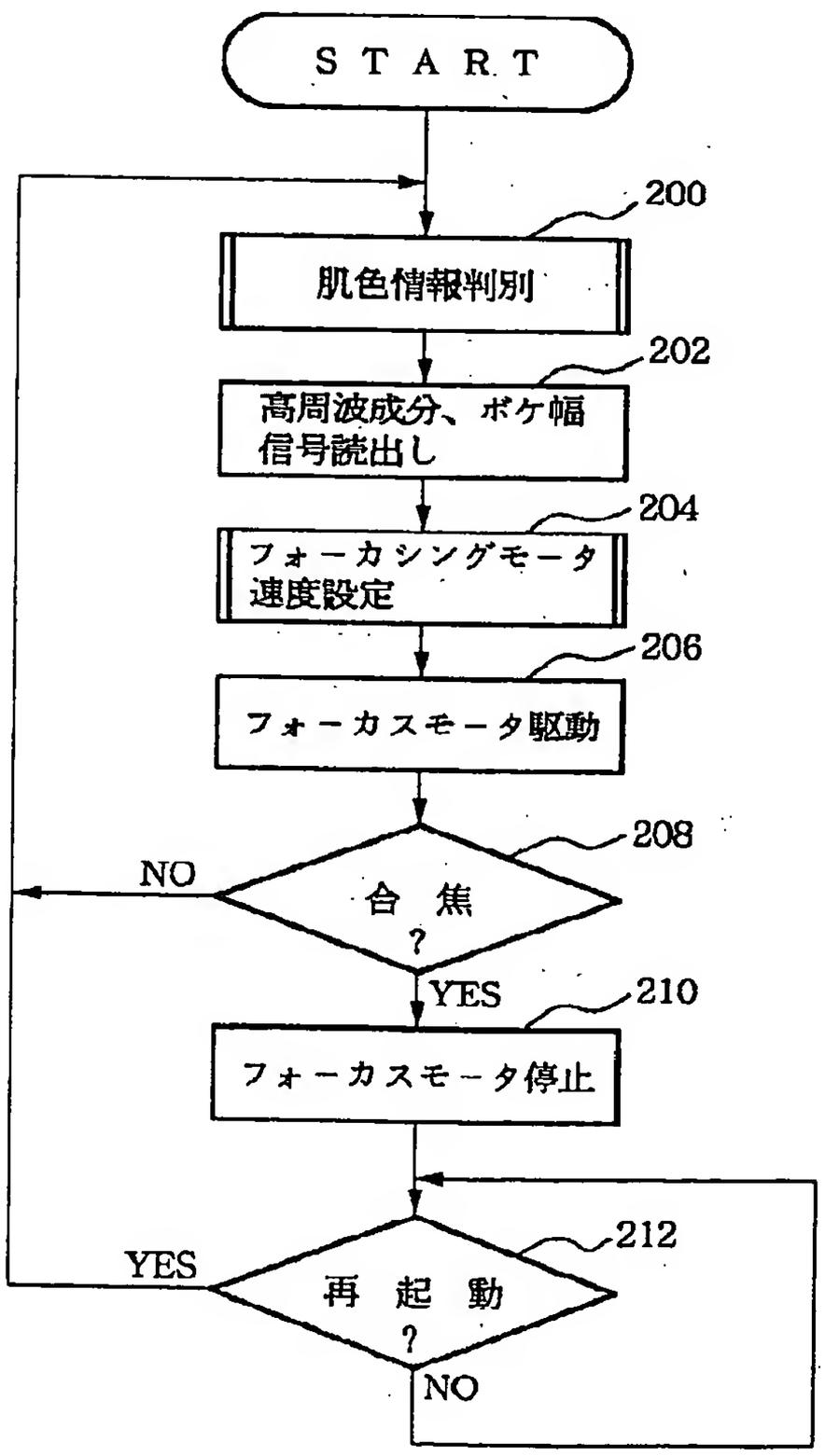
【図４】図３の肌色情報判別ルーチンにおける肌色領域を示す説明図である。

【図５】図２のフォーカシングモータ速度設定ルーチンの詳細な動作を説明するためのフローチャートである。

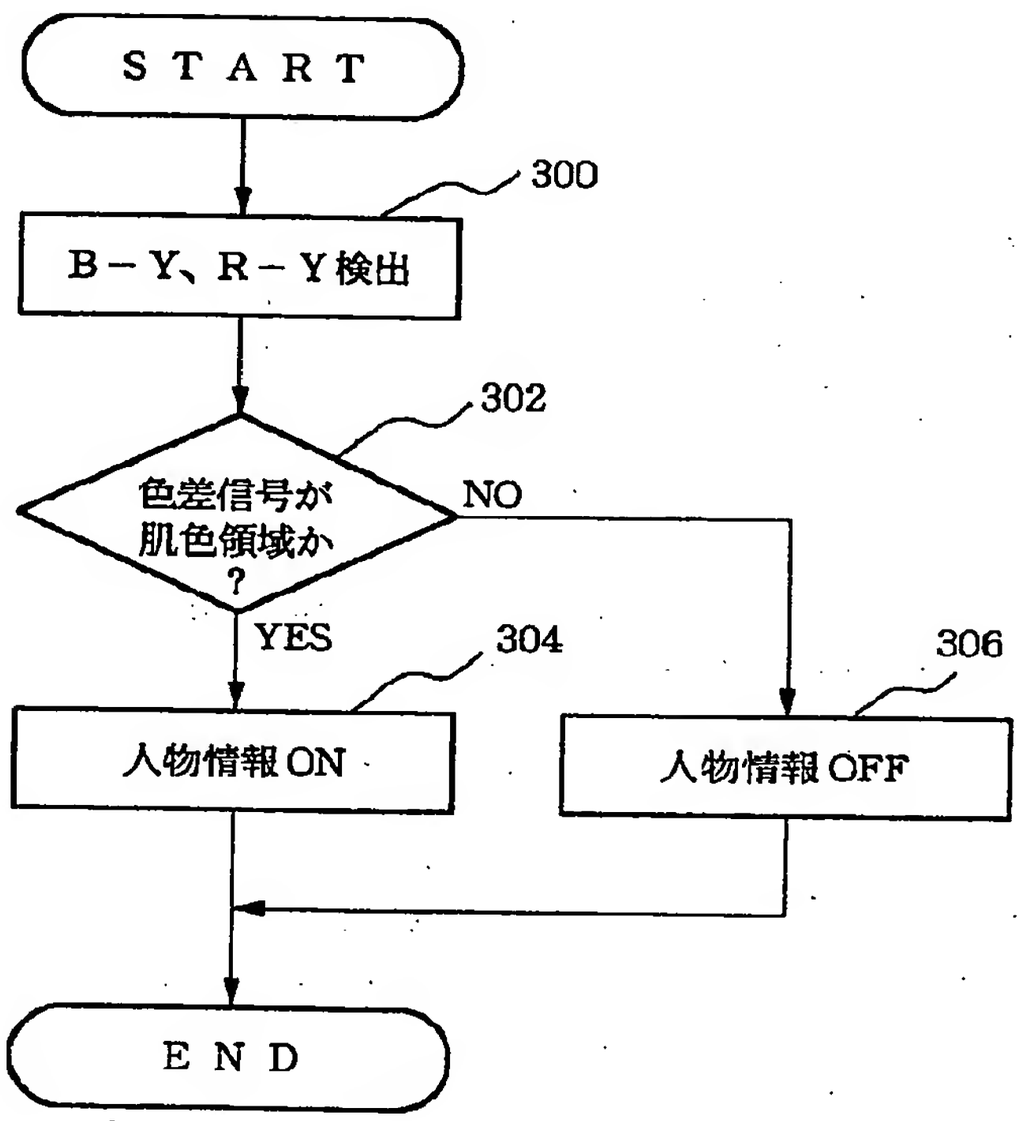
【符号の説明】

１００　フォーカシングレンズ群
１０４　固体撮像素子
１１０　肌色情報検出部
１１１　輝度情報検出部
１１２　バンドパスフィルタ
１１４　ぼけ幅検出回路
１２０　論理制御装置
１３０　フォーカス駆動回路
１３２　フォーカシングモータ

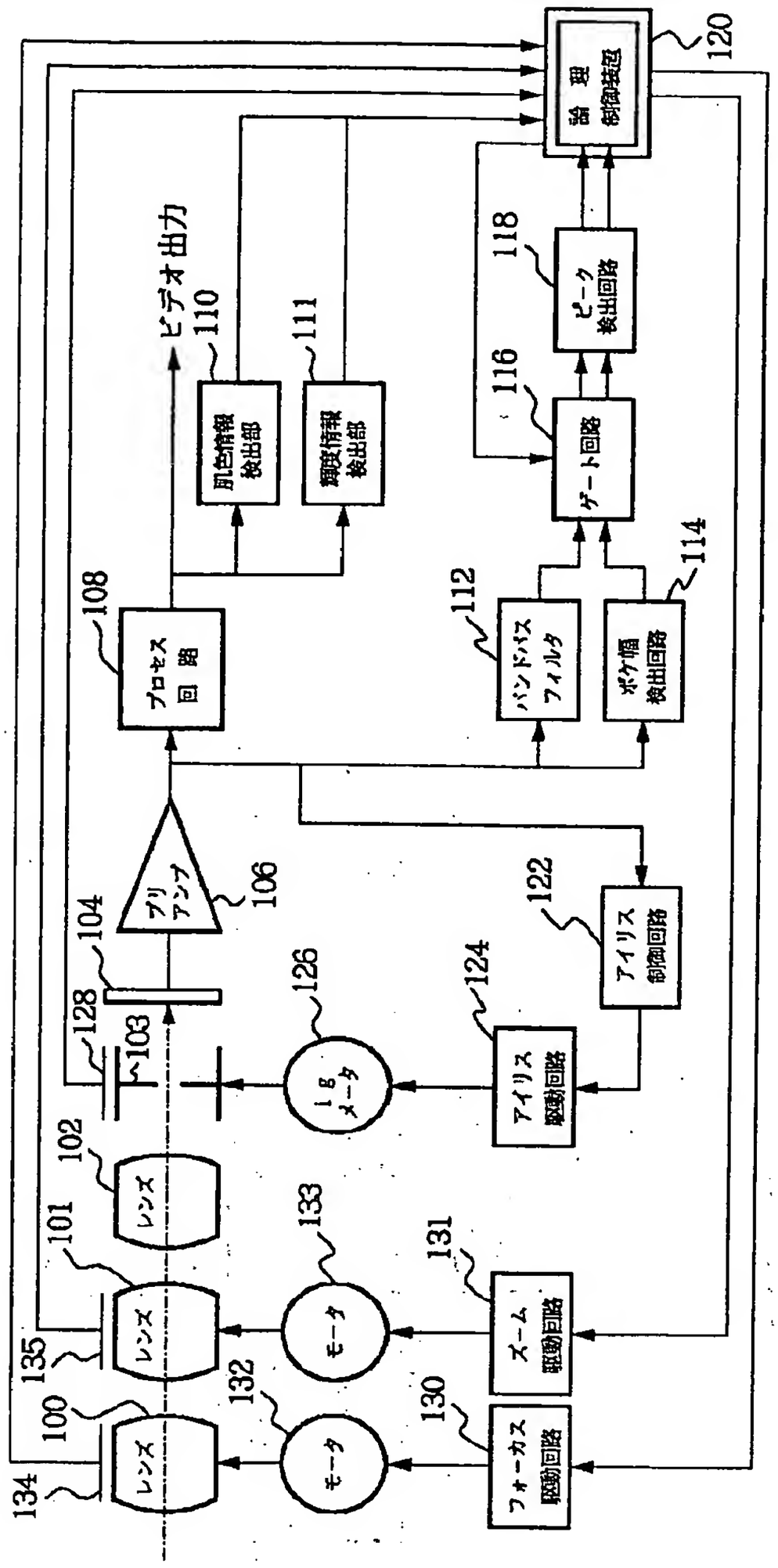
【図２】



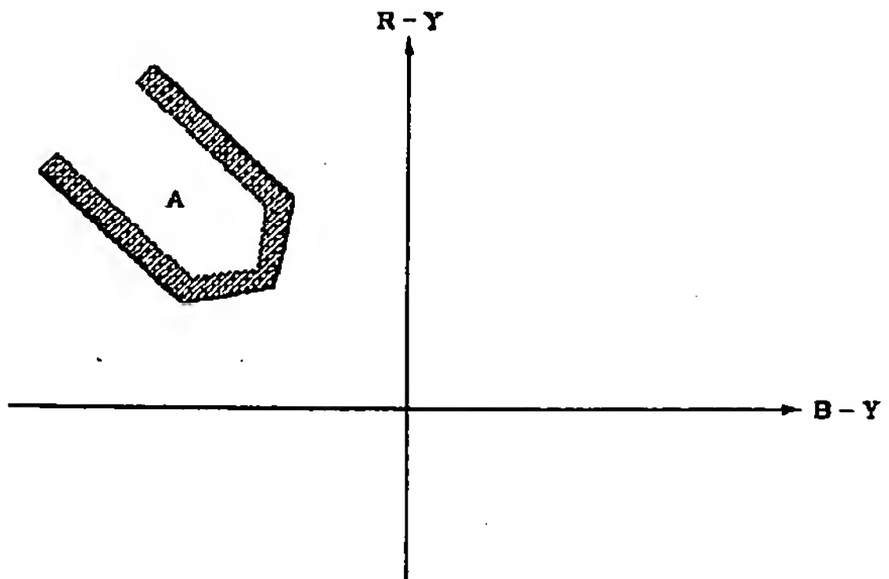
【図３】



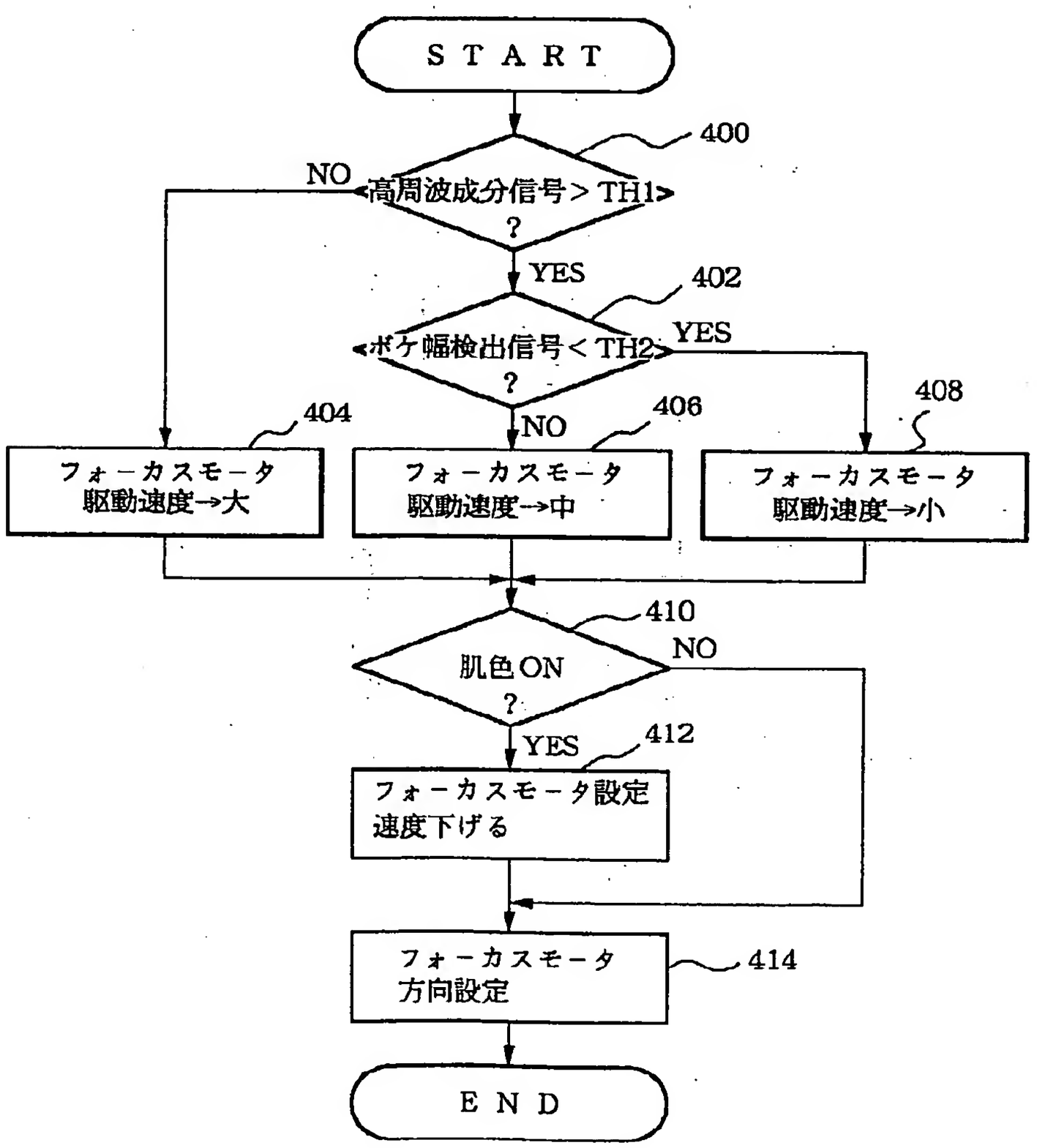
【図１】



【図４】



【図５】



CLAIMS

(57) [Claim(s)]

[Claim 1] Image pick-up equipment characterized by having a control means which acquires continuously an image corresponding to each of two or more of said set-up set points by setting up the set point of said white balance accommodation means corresponding to a white balance accommodation means to adjust a white balance of an image picturized by image pick-up means, and two or more division fields of a photography screen, respectively, and adjusting said white balance accommodation means.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the white balance control at the time of still picture photography especially about image pick-up equipment like the video tape recorder one apparatus video camera which can record a still picture with an animation.
[0002]
[Description of the Prior Art] In recent years, in the field of magnetic recording, the demand to high density record is increasing, the travel speed of a tape is reduced also in a video tape recorder (VTR), and still higher-density magnetic recording is performed increasingly.
[0003] When the travel speed of a tape fell, for example an audio signal is recorded using the fixed head, a large relative velocity cannot be taken but the trouble that playback tone quality will deteriorate arises. There is the method of carrying out sequential record of the audio signal which made longer than before the length of the truck operated by the rotary head as one means to solve this, and carried out time base compaction to the extension. It is PCM-ized by the portion of "theta" which specifically twisted around the rotating cylinder more than whenever (180+theta) by this method in revolution 2 head helical scan type VTR to having twisted the magnetic tape around the rotating cylinder 180 degrees or more conventionally, and was twisted around the excess, and is the method of recording the audio signal carried out time base compaction.
[0004] Drawing showing the tape transit system of VTR according [drawing 1] to such a method and drawing 2 are drawings showing the record locus on a magnetic tape with VTR shown in drawing 1 . Similarly a rotating cylinder, the arm head with which a magnetic tape and 2 were attached in three and four were attached in the cylinder 2 for 1 in drawing 1 , the video signal record section portion (video field) of the truck with which 5 was formed on the magnetic tape 1, and 6 are PCM audio signal record section portions (audio range). The video field 5 is traced by arm heads 3 and 4 by part for the 180 degree of a rotating cylinder 2, and an audio range 6 is traced by part for theta of a rotating cylinder 2.
[0005] As mentioned above, recording a static image on the above-mentioned digital signal record section 6 with a digital signal is proposed as an example adapting the method of recording a digital signal on another field, recording a video signal. If it is a static image, by carrying out the multiple-times scan of the above-mentioned PCM field, it is possible to record the information altogether on a magnetic tape 1. According to this method, it becomes possible using the same record medium as the same photography equipment as animation photography to obtain a high-definition static image from the static image which suspends the transit of a tape in the conventional VTR and it not only can perform still picture photography, but reproduces the video signal of the same truck.
[0006]
[Problem(s) to be Solved by the Invention] However, in the above conventional examples, since it is going to photo a still picture with the camera currently originally designed for animation photography, there are the following defects.
[0007] (1) When the flash and photographic subject which carry out still picture photography change rapidly, automatic white balance accommodation (hue accommodation) does not fulfill the change, but may be photoed with the different hue, the saturation, etc. from a actual color.
[0008] (2) Since time amount will be taken although it is small by the rendering of a actual color if

the so-called color jump takes place by the case where the color temperature of the light source changes rapidly etc., the still picture photoed in the meantime will become an unnatural color.
[0009] (3) Since the white balance was set up when the average of the chrominance signal of the one whole screen became white, there was a case where the color of some fields in a screen was unreproducible. For example, since red is judged to be white when it is the still picture photography people are standing in front of the big red building, there is that a color is no longer a mass color in **.
[0010] It was made in order that this invention might cancel the above points, and the object is in offering the image pick-up equipment which can obtain the playback image of a natural hue, even if the abrupt change of a photographic subject, the abrupt change of the color temperature of the light source, etc. arise at the time of still picture photography.
[0011]
[Means for Solving the Problem] It is a white balance accommodation means adjust a white balance of an image by which image pick-up equipment of this invention is picturized with an image pick-up means in order to attain the above-mentioned object, Corresponding to two or more division fields of a photography screen, the set point of said white balance accommodation means sets up, respectively, and it is characterized by to have a control means which acquires continuously an image corresponding to each of two or more of said set-up set points by adjusting said white balance accommodation means.
[0012]
[0013]
[0014]
[0015]
[Function] Since two or more screens and a still picture are photoed in this invention, making it change using two or more white balance set points set up before photography at every still picture photography of white balance setting out of one sheet when a release carbon button is pushed at the time of still picture photography, only the screen currently photoed good after that is extracted, and it becomes possible to compound two or more screens and to obtain the playback drawing of the most natural hue by the suitable image processing.
[0016]
[Example] Hereafter, the example of this invention is explained to details with reference to a drawing.
[0017] (The 1st example) Drawing 3 shows the circuitry of the video camera of the 1st example of this invention. In this Fig., the 1st group lens for focuses in 101 and 102 extract a variable power lens, a correcting lens and 104 extract 103, 105 is the 4th group lens of immobilization and 106 is an image sensor. A driver for each of these to carry out motorised [of the motor for the object for focuses, the object for scale-factor accommodation, and drawing accommodation in respectively 107,108,109 and 110,111,112] and 113,114,115 are the encoders for detecting a lens location and a drawing condition. The switch with which 116 extracts an AGC (automatic gain control) circuit, a high pass filter (HPF) and 118 extract 117, a zoom tele switch and 125 change a zoom wide switch, and, as for 126, a pull-up resistor and 124 change [the comparator (COMP) for accommodation and 119] the photography mode of a still movie in a microcomputer (MPU), and 120 and 121,122,123,128, and 127 are the release switches for still drawing photography.
[0018] It is the digital disposal circuit to which the color separator with which 128 takes out a chrominance signal, and 129 generate a white balance (AWB) circuit, and 130 generates a color-difference signal and a chrominance signal from a primary signal. The color sensor to which 132 detects the color temperature of the light source, and 133 are digital disposal circuits which compound the signal from a color sensor 132, and the signal from a microcomputer 119.
[0019] Moreover, as for the encoder with which 134 generates an NTSC signal, the image memory with which 135 incorporates a still picture, the control circuit where 136 controls the recording start and clearance of an image memory 135 according to the timing of release and record by the release switch 127, the signal transformation circuit changed into a suitable signal for 137 to record the output of an image memory 135 on a magnetic tape 140, and 138, amplifier and 139 are arm heads.
[0020] When the image memory which is shown with a sign 135 and to be used is plurality, the

surrounding circuitry of those image memories comes to be shown in drawing 4 . Set to this Fig. They are the switch which chooses the memory 1101, 1102, and 1103 remember image memory and 1104 remembers a still picture to be, respectively, and the switch which chooses whether 1105 reads the content of which memory and records it on a magnetic tape 140. Since a control circuit 136 needs to double the timing of release with record and needs to control switches 1104 and 1105, it is communicating to a microcomputer 119, the signal transformation circuit 137, and mutual.

[0021] if a still picture is recorded on the PCM audio signal record section section on a magnetic tape 140 with an arm head / tape relative velocity equal to the time of animation record photography record as shown in drawing 1 and drawing 2 , for example it is going to record a still picture on the PCM audio signal record section section for 30 degrees of contact angles -- number - more than ten -- truck time amount, i.e., number, - the record time of a vertical-synchronization period is required more than ten, and a possibility of stopping being enough for a moment for a good picture in the meantime comes out. However, since the following still picture is memorizable in other memory even if it does not record on a tape immediately after memorizing still picture information in one memory if two or more image memories 1101-1103 are used as shown in drawing 4 , the advantage that it is not necessary to miss a moment for a good picture arises.

[0022] the amount further determined as the value of the current white balance decided by the hue accommodation (automatic white balance) function for animation photography in the 1st example of this invention -- a primary signal -- two or more white balance values to which the mixing ratio was changed are set up, and the still picture of two or more sheets is obtained by taking a photograph to each white balance. According to the condition signal of a digital disposal circuit 133, a microcomputer 119 performs setting out of this white balance, namely, a microcomputer 119 transmits a selection signal to a digital disposal circuit 133 for that setting out, and performs it by controlling the white balance circuit 129 through a digital disposal circuit 133.

[0023] First, the procedure which photos a still picture is explained briefly. Drawing 5 shows the concept of the still picture record method. As for the field or the frame memory 135 which once incorporates a still picture, a push on the release carbon button (release switch) 127 incorporates the image of the flash. The incorporated video signal is recorded on the PCM field 146 as the conventional example described it. At this time, sequentially from the still picture of the 1st sheet, it will be recorded on the area of 1201, 1202, and 1203, and will go. It is supposed at this record that the time amount of more than 10 - a dozens vertical-synchronization period is usually required.

[0024] Drawing 6 shows the appearance of the video camera which contains the circuit of drawing 4 . a book -- a Fig. -- setting -- 201 -- a video camera -- the whole -- 202 -- a zoom -- a call -- a switch -- (-- T --) -- 124 -- a zoom -- wide -- a switch -- (-- W --) -- 125 -- being equivalent -- a function -- having -- a zoom -- changing -- a zoom -- a switch -- it is . The change procedure in in a still / animation photography mode when a change or the release switch 127 of the photography mode changeover switch 126 is pushed is shown in drawing 7 .

[0025] In the flow chart of drawing 7 , if initiation of a spawn process program is carried out at step 301, still picture mode (SV) and a cine mode (MV) will be chosen by the check of whether the release switch 127 was pushed at step 302 into the switch position of the photography mode changeover switch 126, or the cine mode. That is, at step 302, if the release switch 127 is pushed even if this switch 126 besides the switch condition of the photography mode changeover switch 126 is an animation side, still picture mode will be chosen. If a cine mode is chosen, animation record processing will be performed at step 303, if still picture mode is chosen, it will distinguish whether the release switch 127 was pushed at step 304 at the time of still picture photography, and, in an affirmation judging, still picture photography processing will be performed at step 305.

[0026] If it explains taking the case of the camera in which image memory is as 3 ** as shown in drawing 4 and still mode will be chosen at step 302, it will stand by until the release carbon button 127 is pushed at step 304. Between this standby, processing as shown in drawing 8 is performed in step 306. Namely, the current white balance set point which an automatic white balance (AWB) defines is read in a digital disposal circuit 133 at step 401, and it memorizes to RAM-B in the

RAM field in a microcomputer 119 by making the set point into a white balance B. next, the white balance B set up at step 401 by step 402 — the rate of R signal (red signal) — for example, it is made to increase twenty percent relatively, it is made into a white balance A, and it memorizes to RAM-A in the RAM field in a microcomputer 119. At the following step 403, like step 402, it is made for B signal (blue signal) or a green signal to increase twenty percent relatively, for example, it makes it a white balance C, and memorizes to RAM-C in a microcomputer 119. The rate of color change of step 402,403 and the combination of a color can be set not only as this but as arbitration. It stands by until the release carbon button 127 is pushed performing processing from the above step 401 to step 403. In addition, when the release carbon button 127 is pushed into a cine mode, it is necessary to process step 401 to the step 403 once [at least].

[0027] If the release carbon button 127 is pushed and it is distinguished from release, still photography processing of step 305 will be performed. It is further divided into processing of steps 404, 405, and 406,407,408,409 by the inside of this step 305. At step 404,405,406, the set point is called from RAM in a microcomputer 119, respectively, setting out of a white balance is made into the above-mentioned set point of A, B, and C, and the photoed image information of three sheets which carried out still picture photography is memorized to field memories 1101, 1102, and 1103, respectively. Record to a magnetic tape 140 is permitted at the following step 407. It distinguishes whether the record to a magnetic tape from the field memory which is operating by another program at the following step 408 was completed by the existence of the completion signal of record. When record is completed, it shifts to step 1409, and record to a magnetic tape 140 is forbidden, and it returns to step 302 of drawing 7 . By the processing so far, the still picture of three sheets with which setting out of a white balance differs by the depression of 1 time of the release carbon button 127 will be recorded on videotape.

[0028] Next, an example of the record actuation to a magnetic tape 140 from field memories 1101, 1102, and 1103 is briefly explained with reference to the flow chart of drawing 9 . If it will distinguish whether record authorization was outputted at step 1302 if a program is started at step 1301, and record is permitted at step 407, it will shift to step 1303. At step 1303, the content of the memory n of the address which sets up Counter n with n= 1101 and Counter n points out at the following step 1304 is recorded on the area 146 of a magnetic tape 140. At the following step 1305, it distinguishes whether record to a magnetic tape 140 was completed, and, in not ending, processing of step 1304 is continued. if it judges that record termination is carried out at step 1305, and only 1 increments the value of n at the following step 1306, considers as n=n +1 and it is not n= 1104 at step 1307 — the processing from step 1304 — carrying out — n= — still image photography of 1102 and 1103 is repeated. If set to n= 1104 at step 1307, the completion of record will be carried out at step 1308, and the completion signal of record will be outputted. If it has distinguished whether it became this completion of record at step 408 of above-mentioned drawing 8 and it is judged to be the completion of record, it will shift to step 409 from step 408, and, on the other hand, the program of drawing 9 will continue waiting for return and the next record authorization from step 1308 to step 1302.

[0029] Thereby, according to this example, a reddish still picture is somewhat obtained with a bluish still picture rather than it is based on a current white balance based on the current white balance set point automatically decided by AWB (automatic white balance). Therefore, while failure of photography decreases since the still picture of two or more sheets can be photographed by two or more white balance setting out even if there are a rapid motion of a photographic subject, change of the light source, etc. at the time of still picture photography, a user can choose the still picture which reproduced the hue of a photographic subject automatically later.

[0030] (The 2nd example) Drawing 10 , drawing 11 , and drawing 12 show the 2nd important section configuration and operations sequence of an example of this invention. The 2nd example of this invention is an example of the content of dividing a photography screen into two or more fields, performing white balance setting out independently in each field, and obtaining two or more sheet still picture by two or more white balance setting out.

[0031] Drawing 10 adds the signal system shown with the sign 501,502 to what extracted the processing portion related to white balance setting out of drawing 3 . That is, for the above-mentioned field division, as shown in drawing 10 , digital-disposal-circuit 133 HE transmission of Vertical Synchronizing signal (VD) 501 and Horizontal Synchronizing signal (HD) 502 is carried out

from a microcomputer 119. A synchronizing signal 501,502 is VD and HD signal which were controlled by the microcomputer 119, and since the level coordinate and vertical coordinate in the screen shown, for example with the sign 604,603 of drawing 11 are found from these signals 501,502, it can determine the field 601 on one quiescence side. And the white balance value only for example, in the field 601 where the photographic subject exists can be set up in the white balance circuit 129 by extracting only the chrominance signal in a field 601 among the chrominance signals from an image sensor 106 by the digital disposal circuit 133. Moreover, if the chrominance signal of the field 602 corresponding to an outer frame is extracted conversely, the white balance of the field 602 which is equivalent to the background of a photographic subject, for example can be determined as it.

[0032] Processing as shown in drawing 12 , using the digital disposal circuit which can set up a white balance according to the above fields is performed. Next, this procedure is explained.

[0033] Like the 1st example, if still mode is chosen at step 302 of drawing 7 , it will stand by until the release carbon button 127 is pushed at step 304. Processing shown in drawing 12 between this standby is performed. Namely, if there is no depression of the release carbon button 127, it will shift to step 701, and the white balance computed from the whole screen current at step 701 is set up, and it memorizes to RAM-B in a microcomputer 119 by making this set point into a white balance B. Next, the white balance in the central field 601 is set up on the basis of the synchronizing signal of VD501 and HD502 at step 702, and it memorizes to RAM-A in a microcomputer 119 by making the set point into a white balance A. Furthermore, at the following step 703, the white balance in the field 602 of an outer frame is set up, and it memorizes to RAM-C in a microcomputer 119 by making the set point into a white balance C. Performing processing from the above step 701 to step 703, it stands by until release is carried out by the depression of the release carbon button 127. In addition, when the release carbon button 127 is pushed into a cine mode, it is necessary to perform processing from step 701 to step 703 once [at least].

[0034] If the release carbon button 127 is pushed and it is distinguished from release at step 304, still photography processing of step 305 will be performed. It is divided into processing of step 404 to the step 409 by the inside of step 305 like the 1st example of drawing 8 . First, the set point of a white balance is called from RAM in a microcomputer 119 at step 404,405,406, by adjusting a white balance to that set point, a white balance is set as A, B, and C, respectively, still picture photography is performed by each of this set-up white balance, respectively, and that photoed still picture information is stored in each field memory 1101, 1102, and 1103. Next, record authorization of a magnetic tape 140 is carried out at step 407, and it continues waiting for the completion of record at step 408. Record on a tape 140 is forbidden until it will escape from step 408 and the writing to the following memory will be completed at step 409, if the completion of record is told with the microcomputer 119 of a recording system.

[0035] The record to a magnetic tape 140 from image memories 1101-1103 is controlled by the control procedure shown by drawing 9 with the microcomputer 119 of a recording system like the 1st example.

[0036] Since the still picture of two or more sheets is obtained carrying out sequential change of the white balance set up according to the field by the above actuation in this example, the still picture of the natural hue which is not influenced by the color of the background of a photographic subject etc. can be chosen later. Moreover, it also becomes possible to obtain the playback drawing which reproduced the mass color in the broad range by composition of two or more screens by the image processing etc.

[0037] (The 3rd example) Drawing 13 and drawing 14 show the operations sequence of the 3rd example of this invention. This 3rd example is an example in case a white balance can be set up according to a field and only one moreover uses a field memory like the 2nd example.

[0038] In this example, the digital-disposal-circuit system shown in drawing 10 like the 2nd example determines the white balance of the field 601,602 shown in drawing 11 . And like the 1st and 2nd example, if still mode is chosen at step 302 in drawing 7 , it will stand by until the release carbon button 127 is pushed at step 304. Processing shown in drawing 13 between this standby is performed. Namely, the white balance computed from the whole screen present at step 1001 of drawing 13 is set up, and it memorizes to RAM2 in a microcomputer 119 by making this set point into a white balance B. Next, at step 1002, the white balance in the central field 601 is set up on

the basis of the synchronizing signal of VD501 and HD502, and it memorizes to RAM1 in a microcomputer 119 by making the set point into a white balance A. At the following step 1003, the white balance in the field 602 of an outer frame is set up, and it memorizes to RAM3 in a microcomputer 119 by making the set point into a white balance C. Performing processing from the above step 1001 to step 1003, it stands by until release is carried out by the depression of the release carbon button 127. In addition, when the release carbon button 127 is pushed into a cine mode, it is necessary to perform processing from step 1001 to step 1003 once [at least].

[0039] If release HOTAN 127 is pushed and it is distinguished from release at step 304, still photography processing of step 305' will be performed. It is divided into processing of step 1004 to the step 1011 by the inside of step 305'. First, it is referred to as n= 1 at step 1004, the set point of the white balance currently written in RAMn at step 1005 is called (this set point is set to A at first), and a white balance is adjusted to that value. Next, the still picture information which photoed still drawing by the white balance setting out at step 1006, and was photoed to the image memory 135 is memorized. Then, the record on a tape 140 from memory 135 is permitted at step 1007, and it continues waiting till the completion of record at the following step 1008.

[0040] If it distinguishes that record was completed, the record on a tape 140 will be forbidden until the following still picture information memory 135 memorizes at step 1009. Distinction processing of being n= 4 is carried out at step 1011 which continues as n=n +1 by addition at the following step 1010. If it becomes n!=4, a white balance will be set to the set point which returned to step 1005 and was stored in the following RAM at step 1005, and processing from step 1006 will be performed again. If set to n= 4, processing of step 305' will be ended and it will return to step 302.

[0041] The record procedure from the image memory 140 in this case to a magnetic tape becomes like drawing 14 . First, this processing is started at step 1401 and it distinguishes that it is record authorization at step 1402. In record authorization, it distinguishes whether the content of memory 135 was recorded on the tape and record completed it at continuing step 1404 at the following step 1403, and it returns to step 1402 by the completion of record.

[0042] The still picture which reproduced the color of the meant photographic subject most beautifully can be chosen later, without receiving effect in backgrounds other than a photographic subject etc., while becoming possible to raise a manufacturing cost at a low price, since the time lag of the youth by the still picture photoed does not need to use two or more memory like the 1st and 2nd example of a certain thing by the above actuation in this example. Moreover, it also becomes possible by compounding two or more screens by the image processing etc. to obtain the playback drawing which reproduced the natural hue in the broad range.

[0043]

[Effect of the Invention] Since the still picture of two or more sheets is obtained according to this invention, carrying out sequential change of the white balance with the set point set up according to the field of a photography screen as explained above The still picture of the natural hue which is not influenced by the color of the background of a photographic subject etc. can be chosen later, and the effect that composition of two or more screens by the image processing etc. enables it to obtain the playback drawing which reproduced the mass color over the broad screen area is acquired.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the typical plan showing the tape transit system of the conventional VTR.
[Drawing 2] It is explanatory drawing showing the record locus on the magnetic tape of drawing 1 .
[Drawing 3] It is the block diagram showing the circuitry of the video camera of the 1st example of this invention.
[Drawing 4] It is the block diagram showing the surrounding detailed configuration of the image memory of drawing 3 .
[Drawing 5] It is drawing showing the record mode in the 1st example of this invention.
[Drawing 6] It is the outline front view showing the appearance of the video camera of the 1st example of this invention.
[Drawing 7] It is the flow chart which shows actuation of the 1st whole example of this invention.
[Drawing 8] It is the flow chart which shows the detailed procedure of the standby process of drawing 7 , and still photography processing.
[Drawing 9] It is the flow chart which shows the record operations sequence to the magnetic tape in the 1st example of this invention.
[Drawing 10] It is the block diagram showing the important section circuitry of the 2nd example of this invention.
[Drawing 11] It is the plan showing an example of the field partition on the photography screen concerning the 2nd example of this invention.
[Drawing 12] It is the flow chart which shows the detailed procedure of the standby process and still photography processing in the 2nd example of this invention.
[Drawing 13] It is the flow chart which shows the detailed procedure of the standby process and still photography processing in the 3rd example of this invention.
[Drawing 14] It is the flow chart which shows the record operations sequence to the magnetic tape in the 3rd example of this invention.
[Description of Notations]
101-103,105 Lens
106 Image Sensor
116 Automatic Gain Control Circuit
119 Microcomputer
124 Zoom Tele Switch
125 Zoom Wide Switch
126 Photography Mode Circuit Changing Switch
127 Release Carbon Button
128 Color Separator
129 White Balance Circuit
130,133 Digital disposal circuit
132 Color Sensor
135 Image Memory
136 Control Circuit
140 Magnetic Tape
202 Zoom Switch
501 Vertical Synchronizing Signal

502 Horizontal Synchronizing Signal
601 Central Field
602 Outer Frame Field
1104 1105 Switch
1201, 1202, 1203 Record area

[Translation done.]

* NOTICES *

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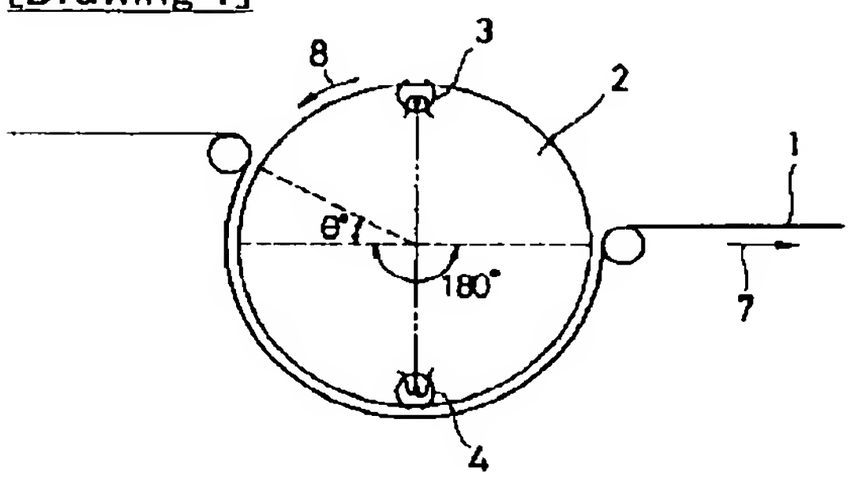
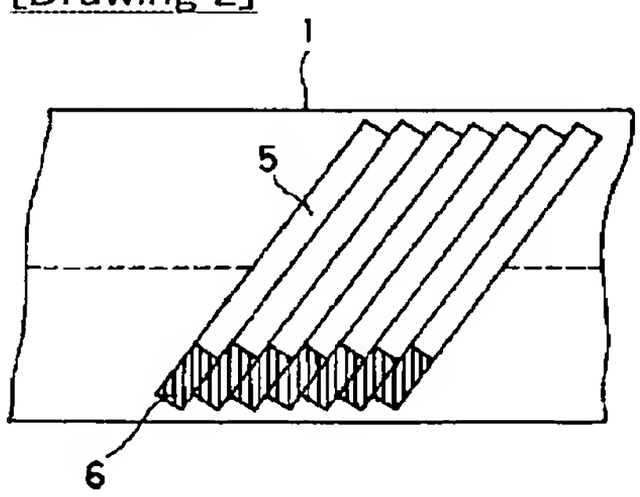
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

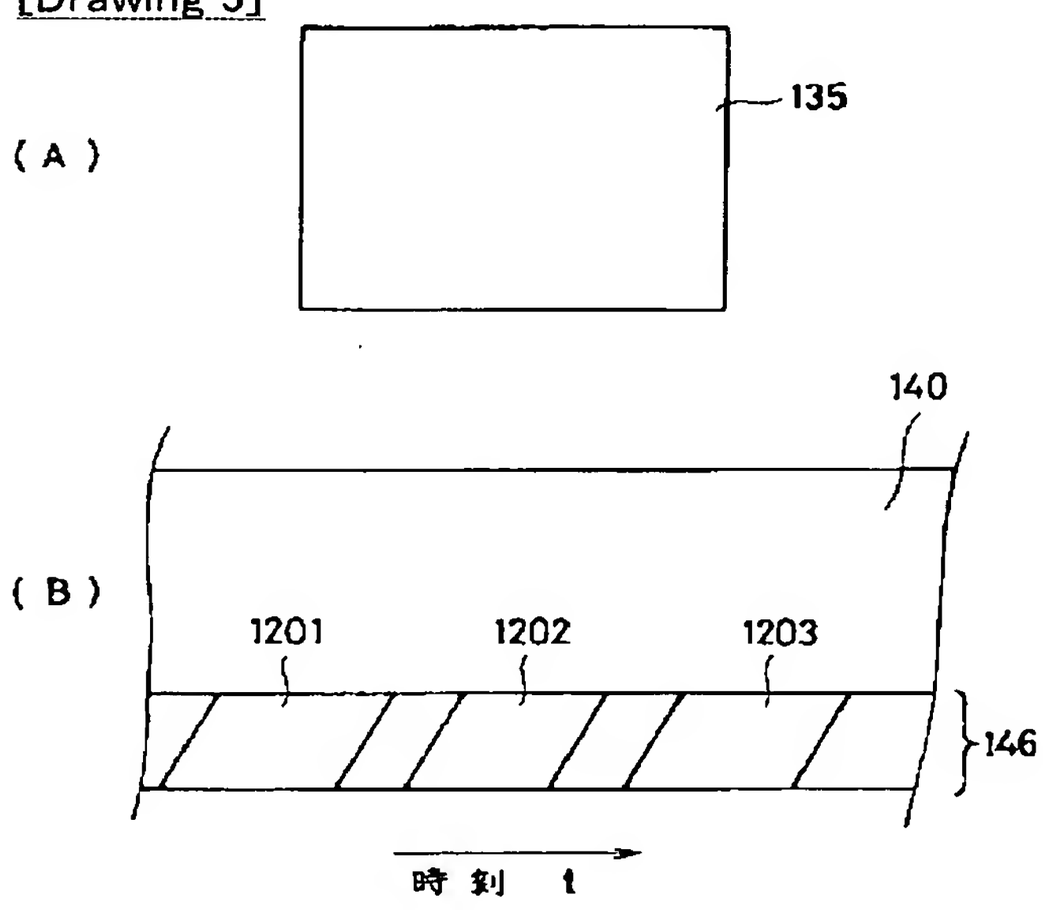
[Drawing 1]



[Drawing 2]



[Drawing 5]



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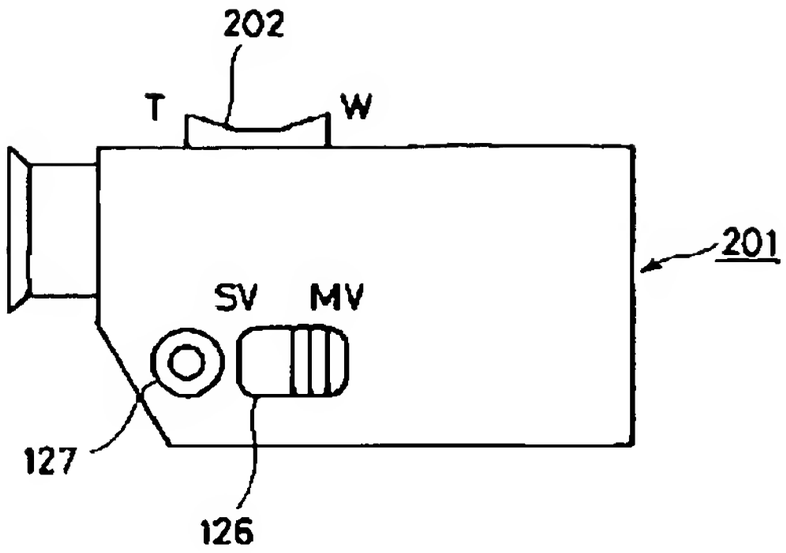

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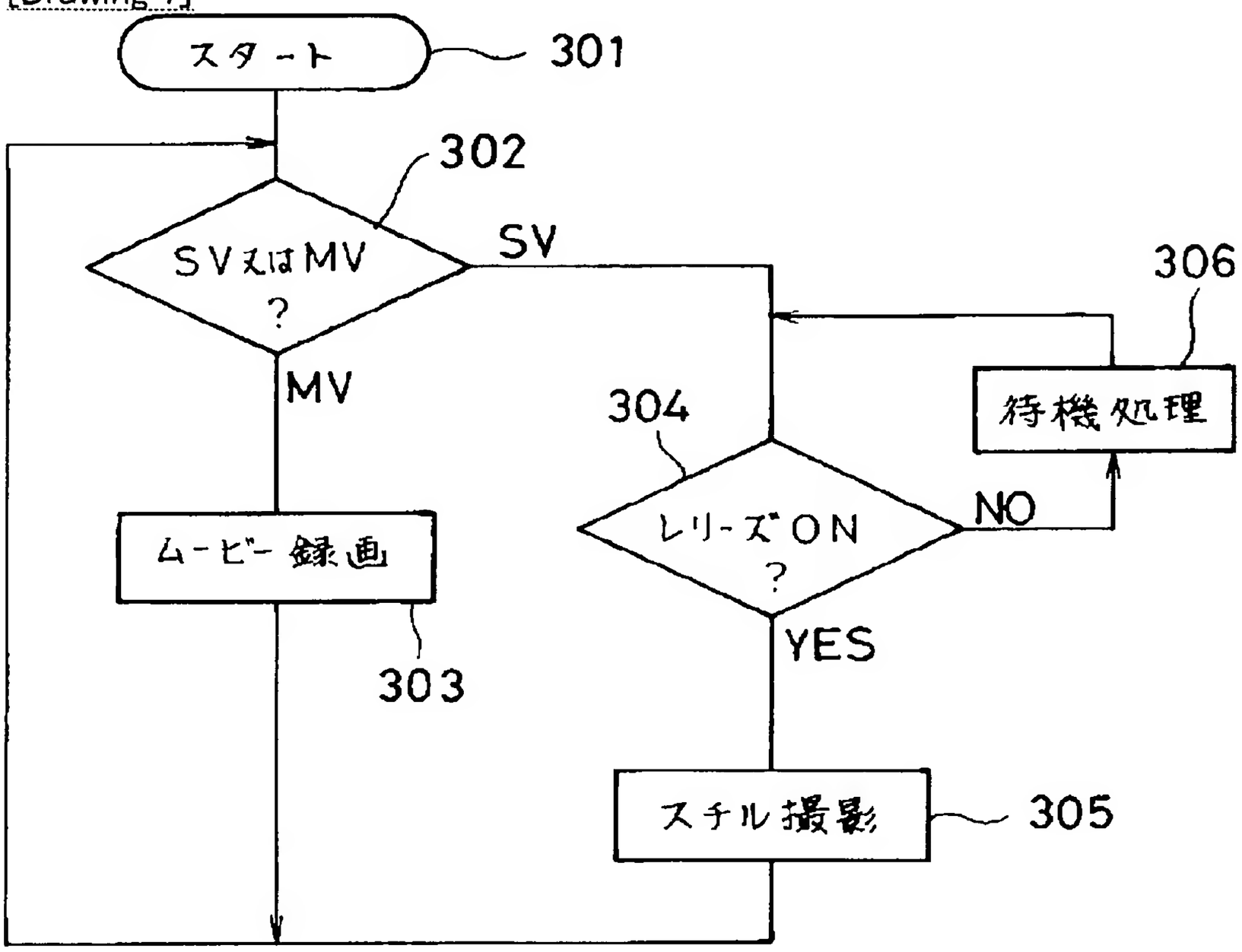
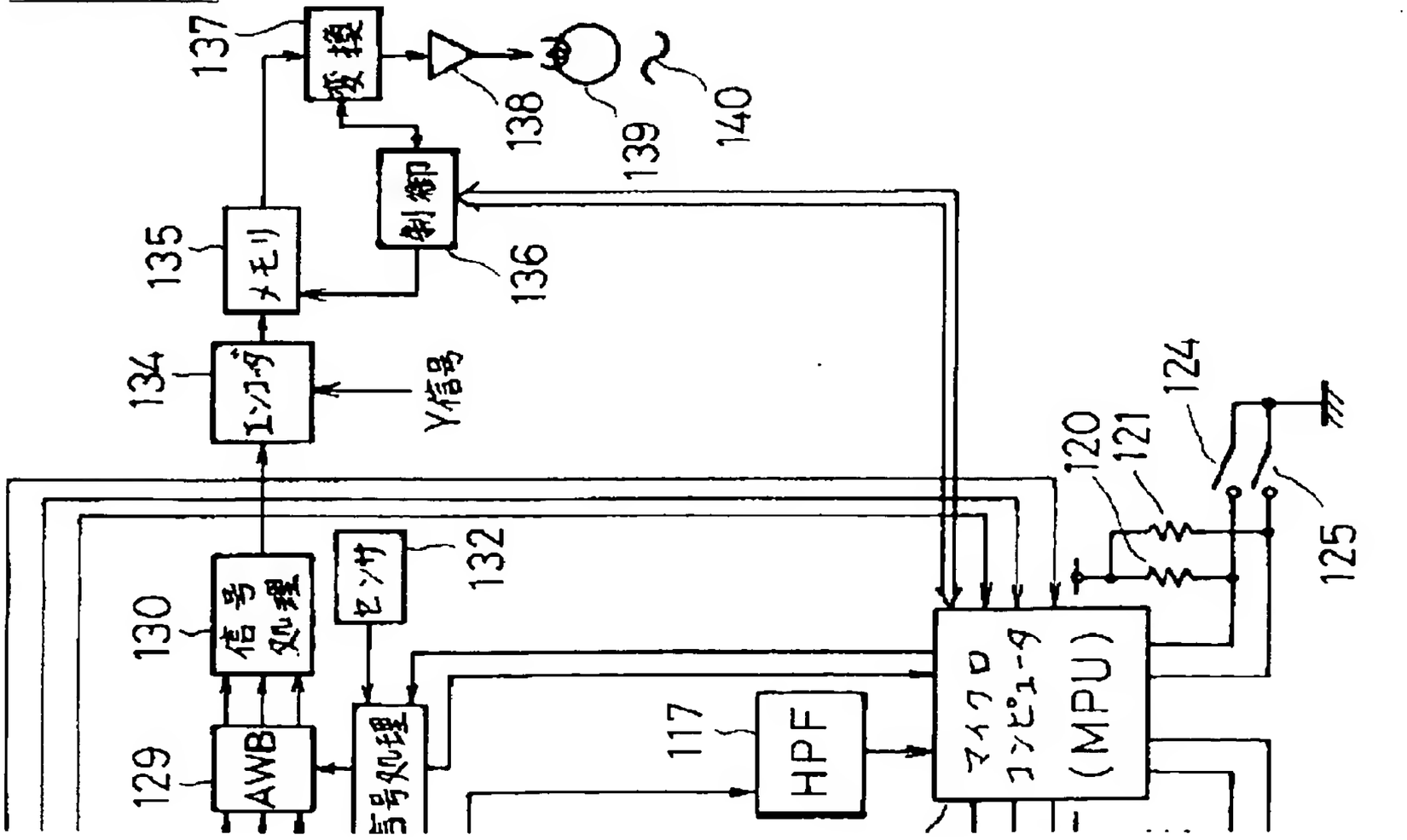
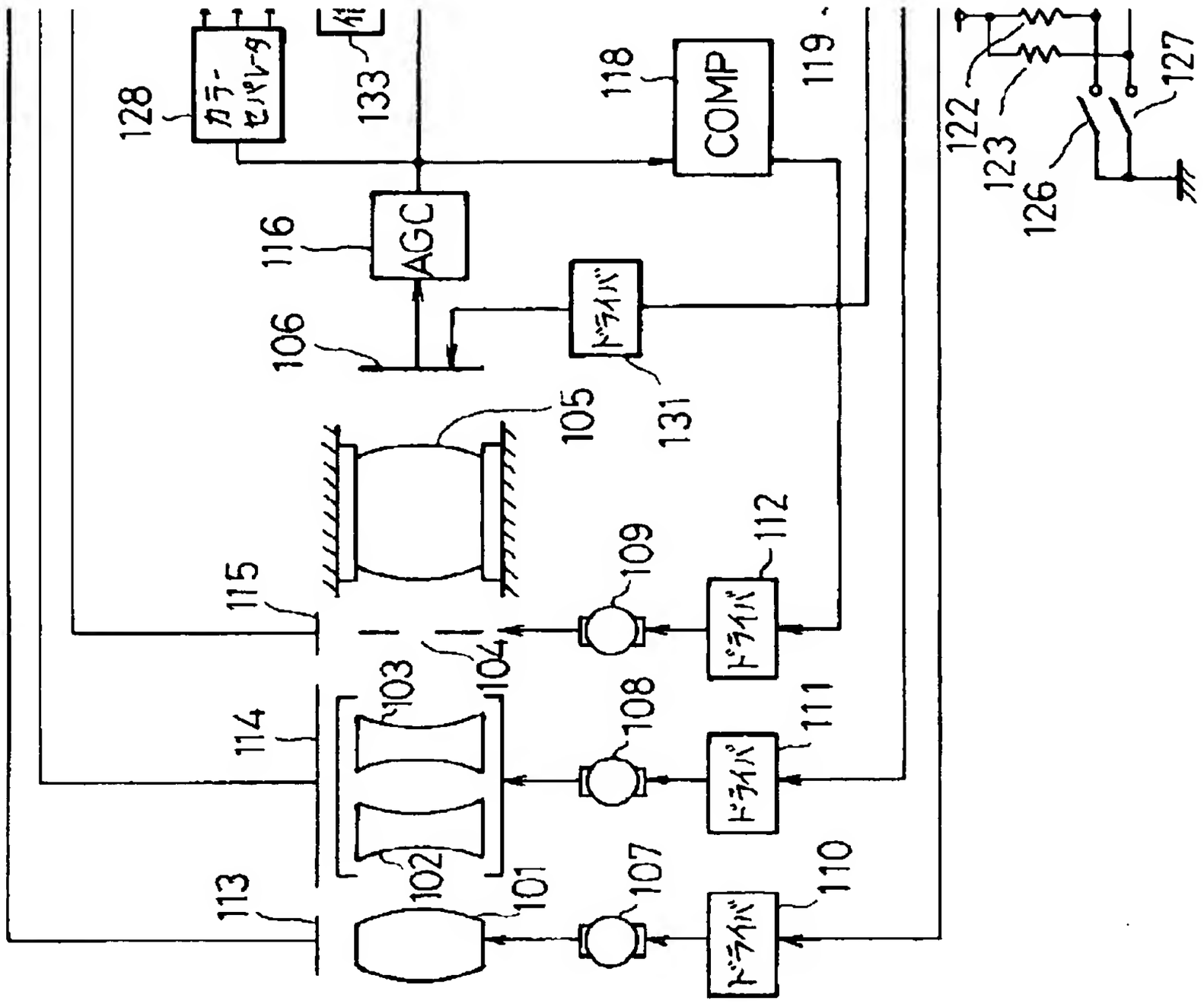


[Drawing 3]





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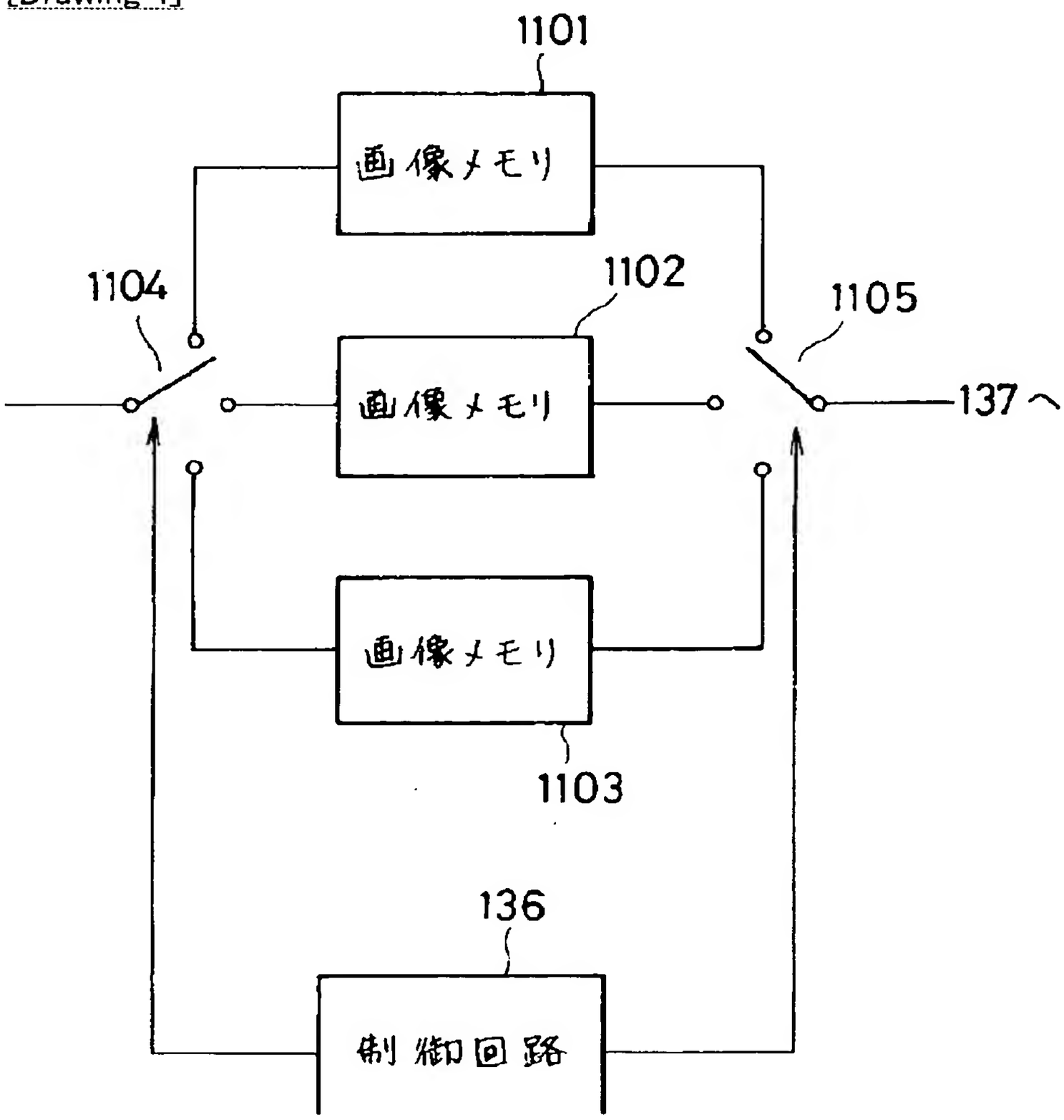
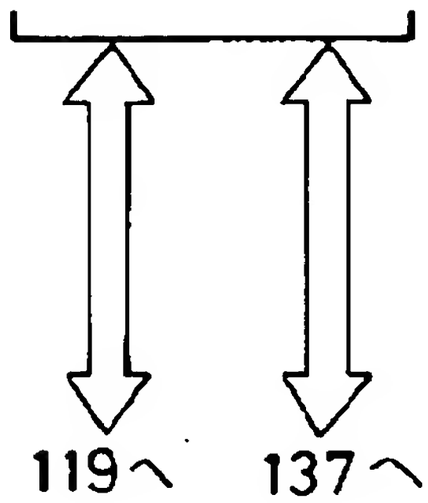
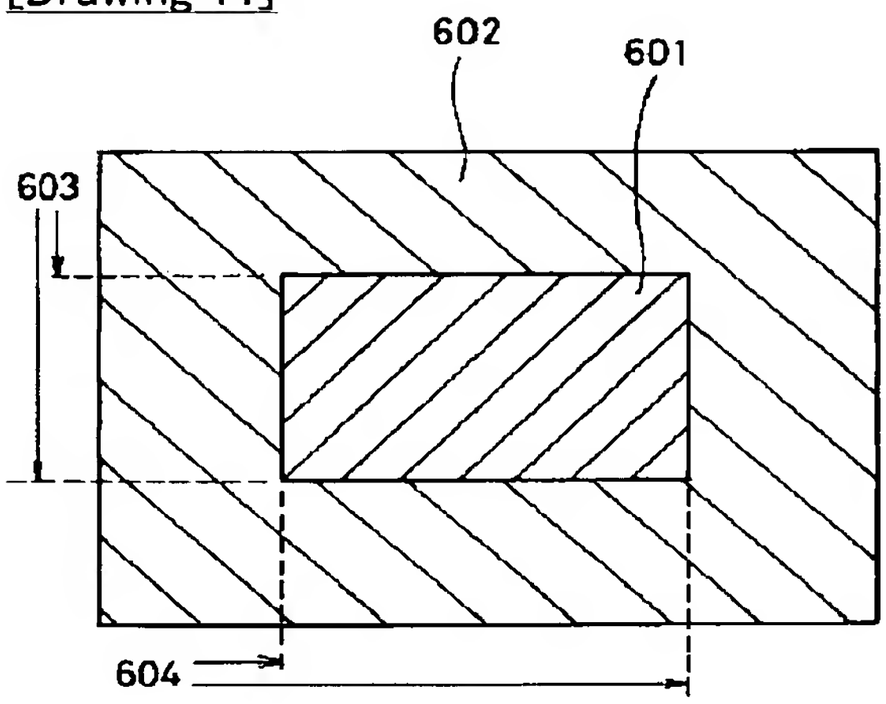
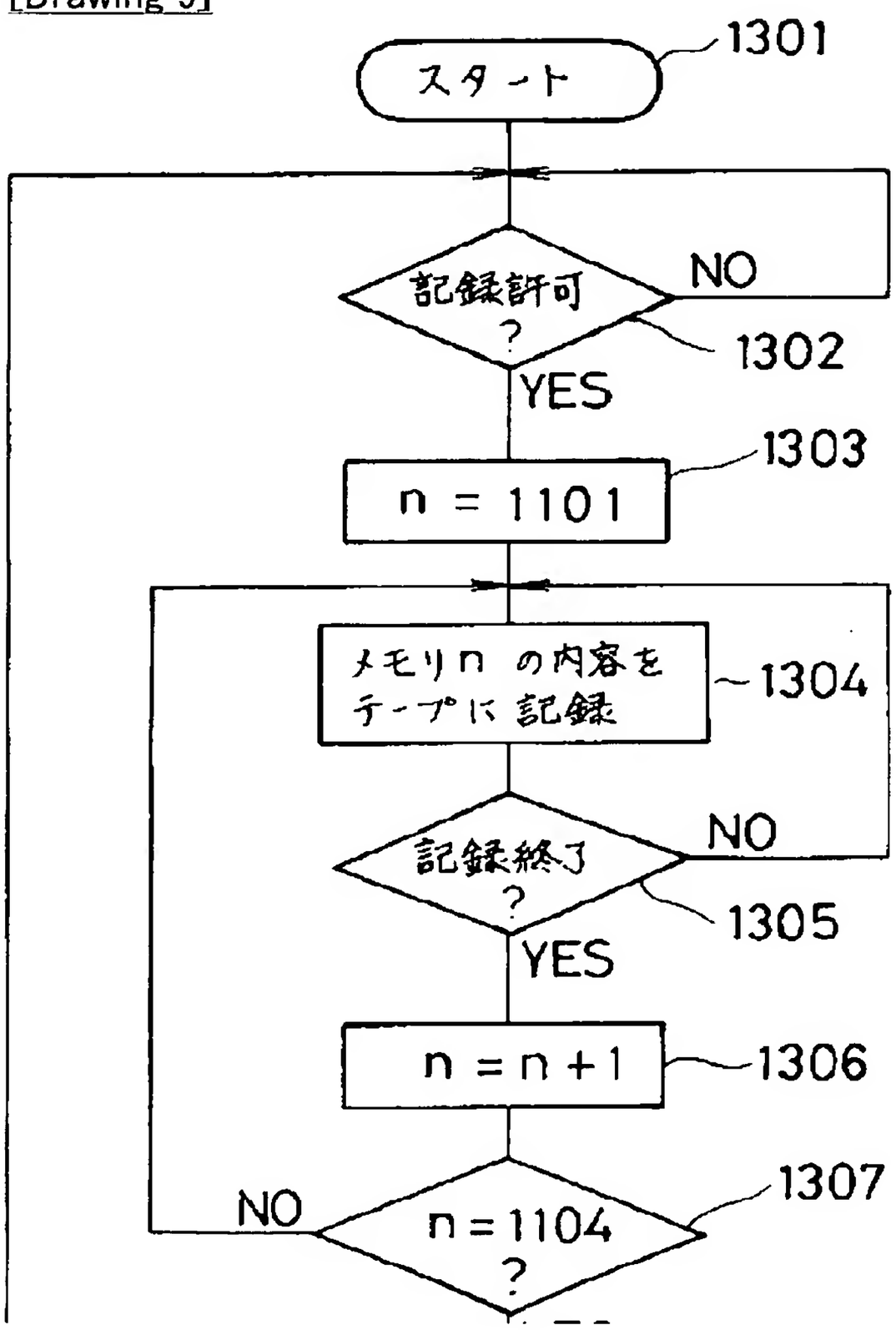


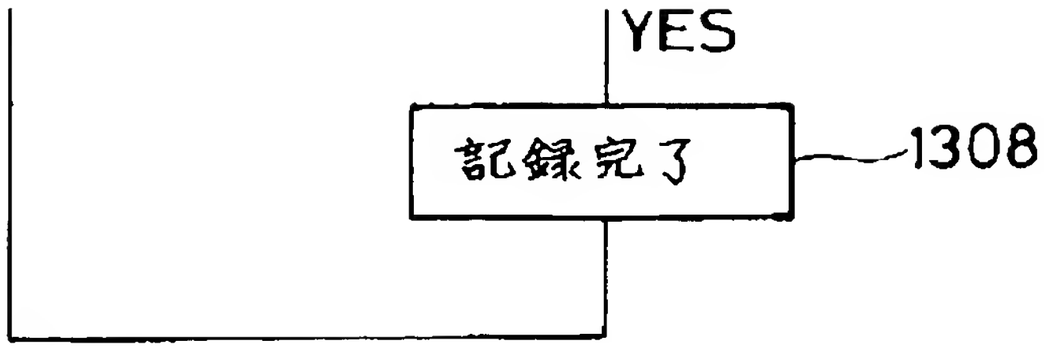


[Drawing 11]

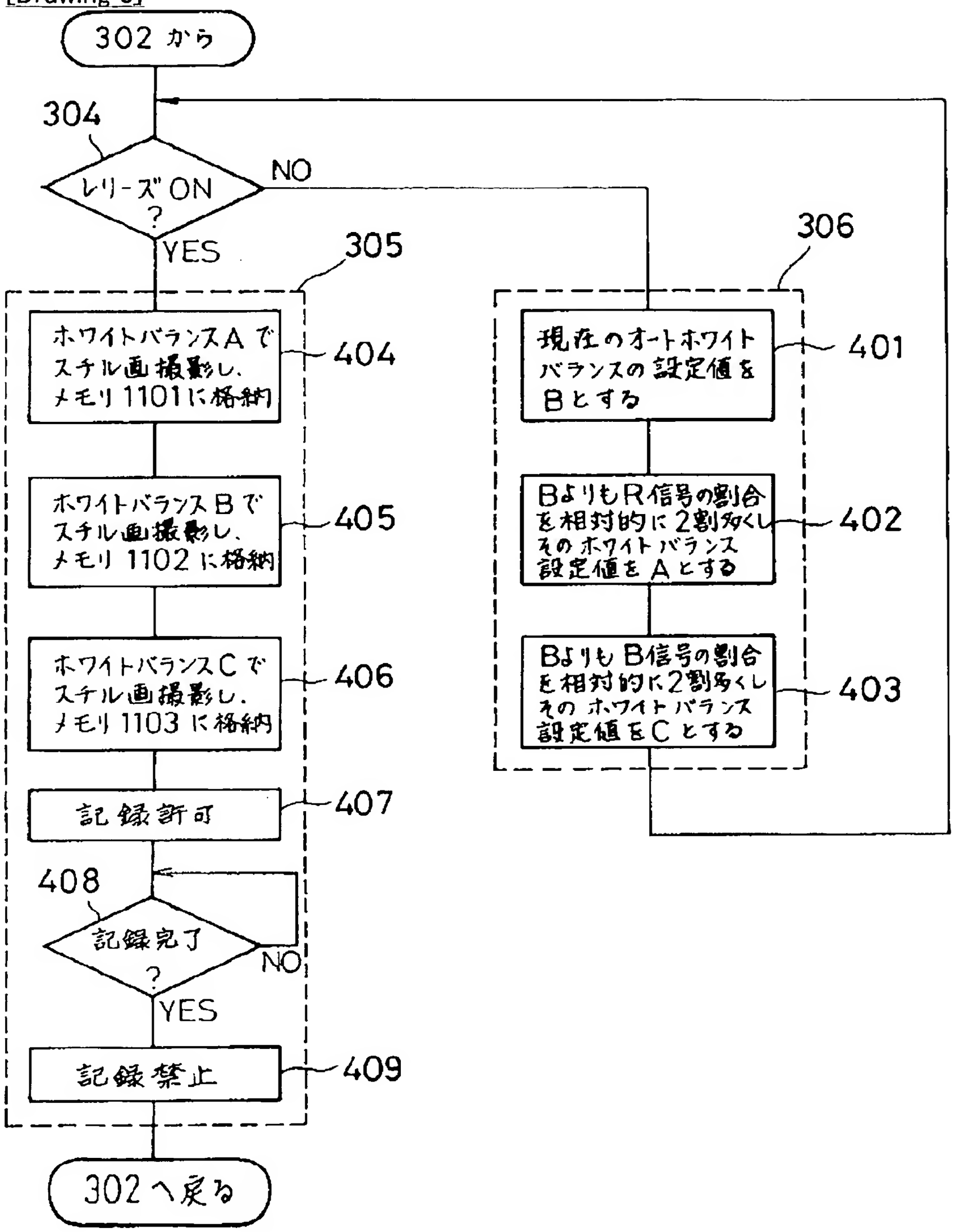


[Drawing 9]

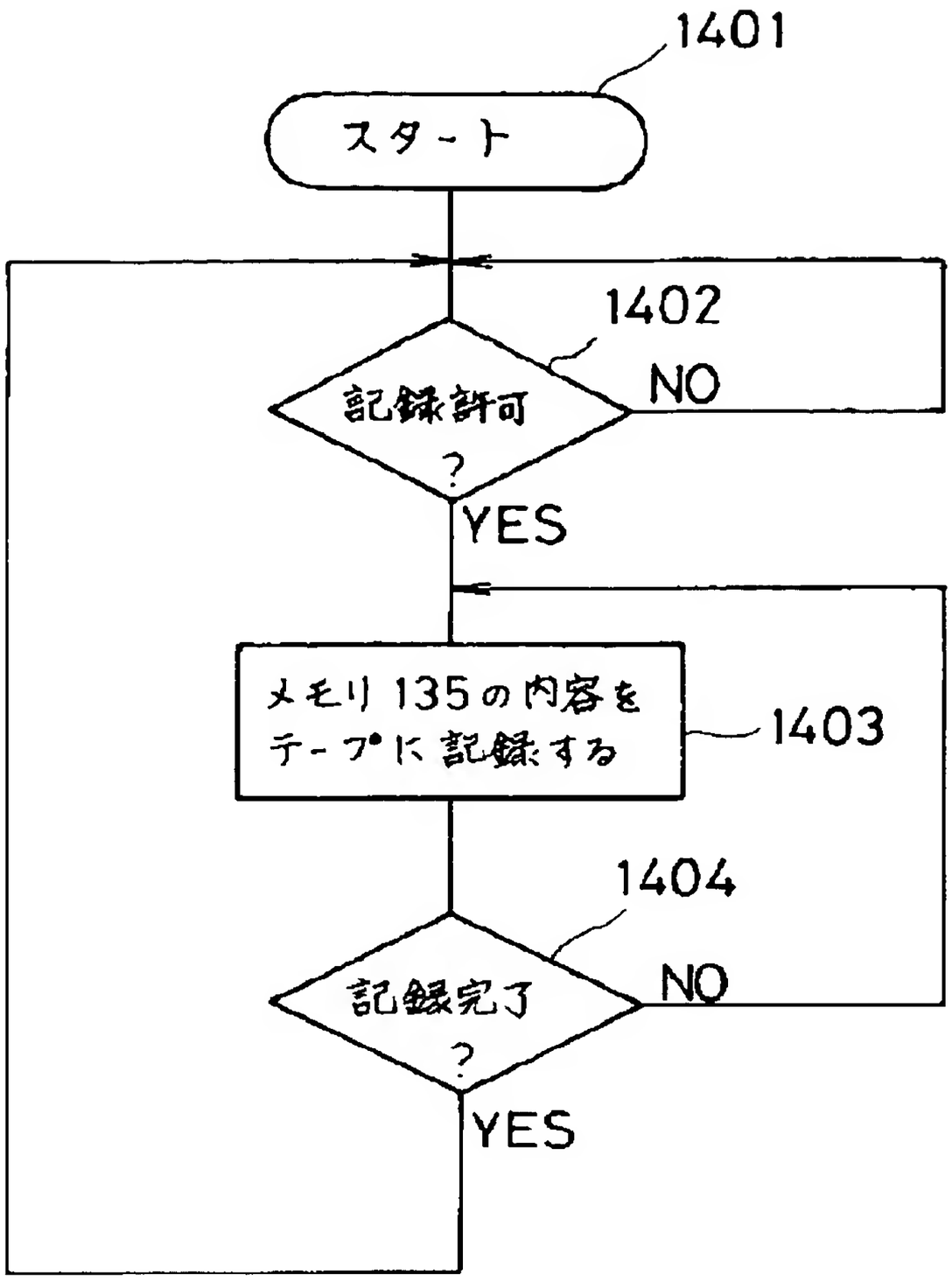




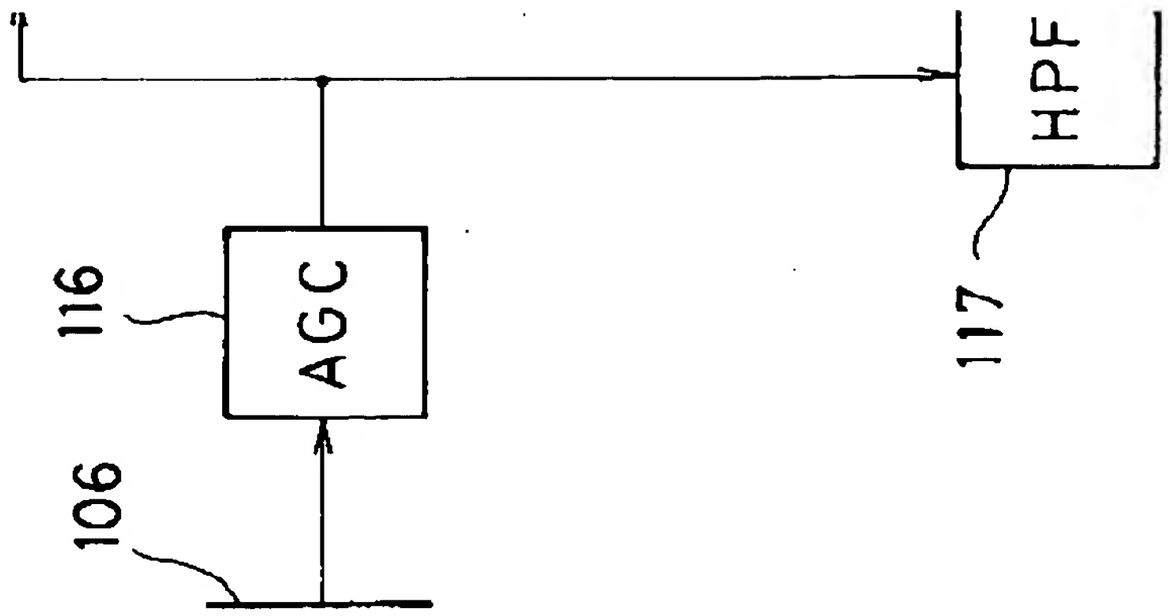
[Drawing 8]



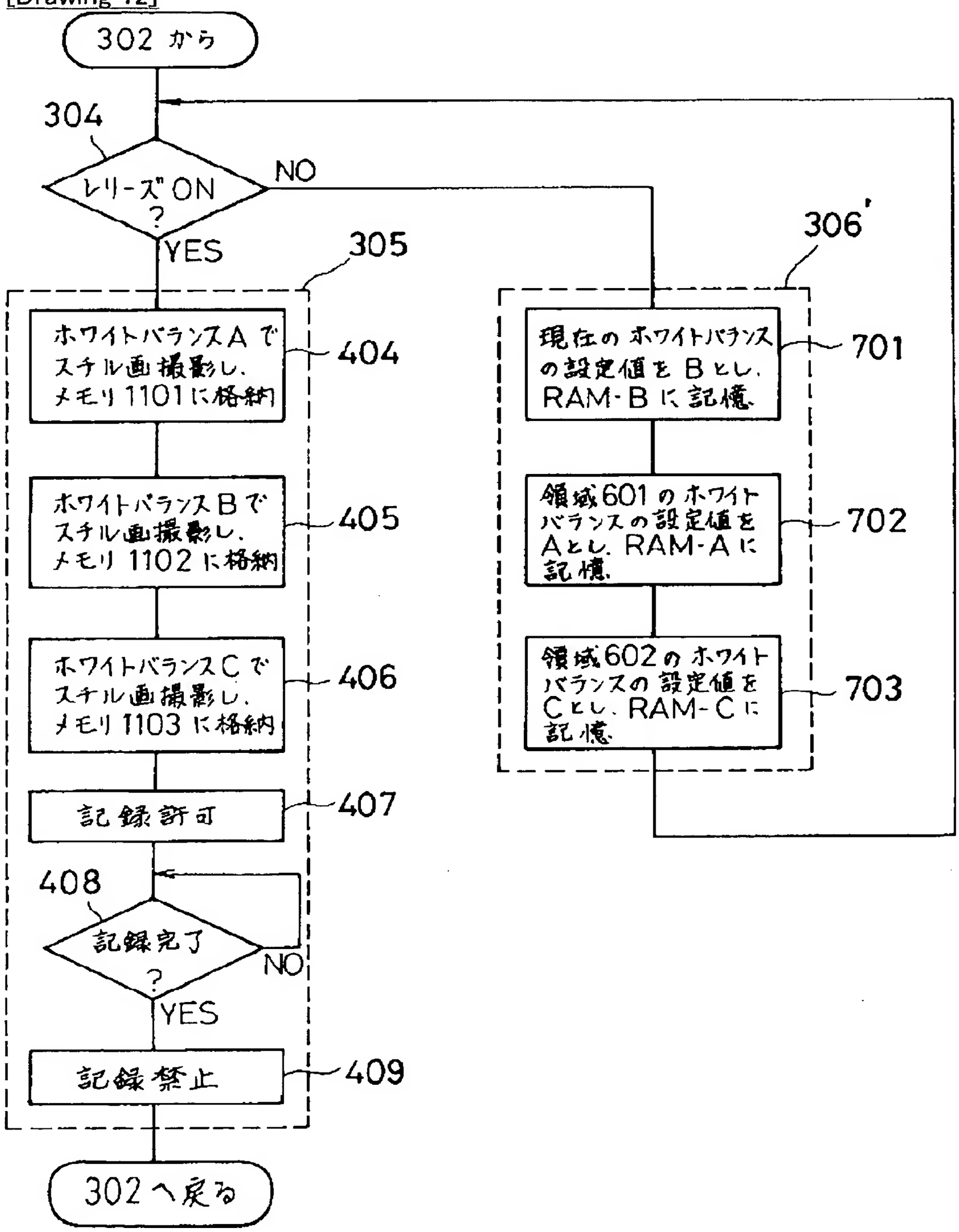
[Drawing 14]



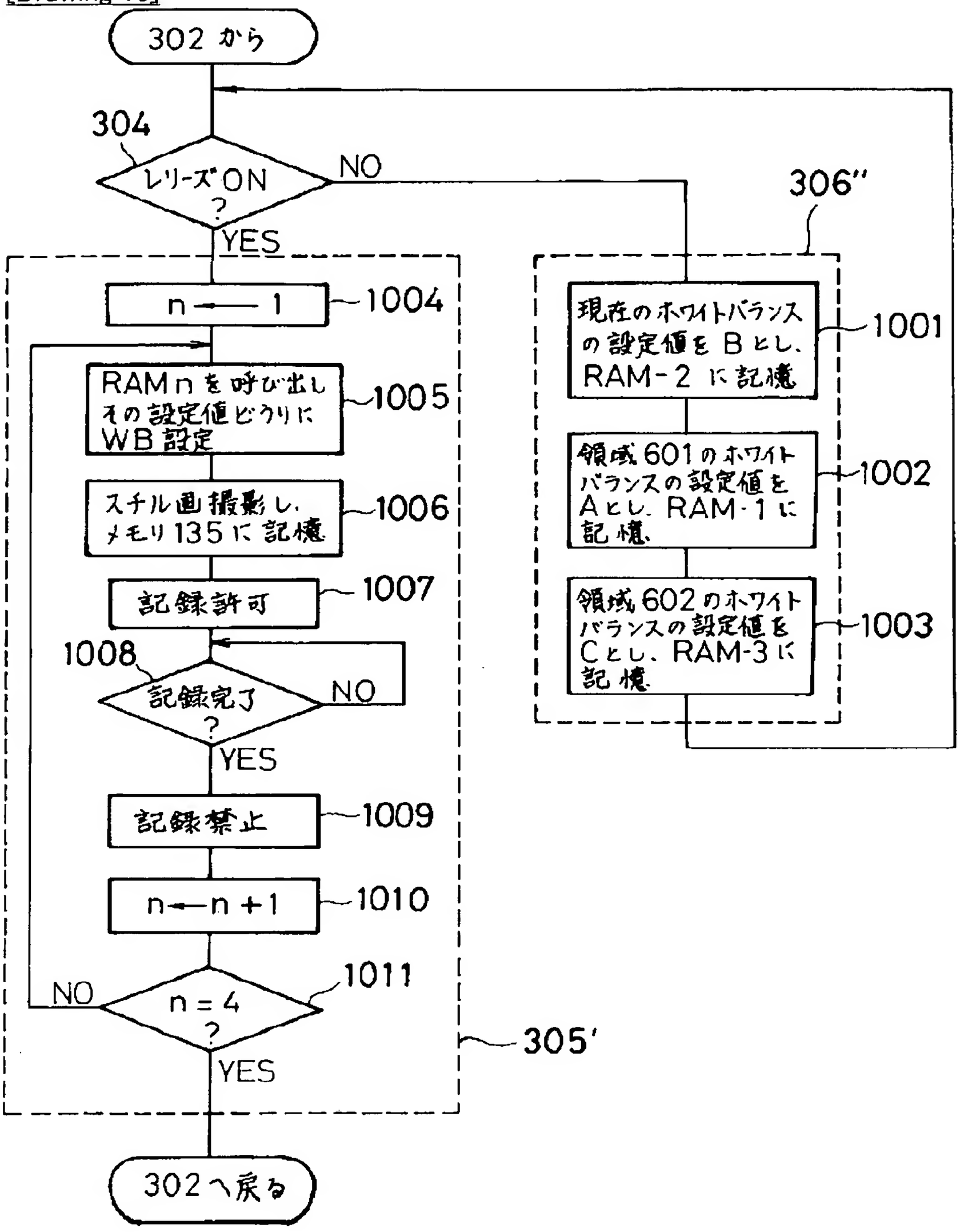
[Drawing 10]



[Drawing 12]



[Drawing 13]



[Translation done.]